TM 11-5815-263-35/2

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

TELETYPEWRITER SETS AN/FGC-56 AND AN/FGC-58

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1962

AGO 6114A

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt motor and control circuits, or on the 115-volt ac and dc line connections. Serious injury or death may result from contact with these circuits. Turn off the power before making any connections or replacing parts inside the equipment.

DON'T TAKE CHANCES!

FOREWORD

Field and depot maintenance instructions for Teletypewriter Sets AN/FGC–56 and AN/FGC–58 are so voluminous that they are published in two manuals as follows:

TM 11–5815–263–35/1 contains chapters 1 and 2 and sections I through XVI of chapter 3 thereof.

TM 11–5815–263–35/2 contains sections XVII through XXVI of chapter 3, and chapters 4 and 5, and appendix and index.

Figures 1 through 208 are contained in TM 11–5815–263–35/1 and figures 209 through 482 are contained in TM 11–5815–263–35/2.

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TECHNICAL MANUAL
No. 11–5815–263–35/2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *7 May 1962*

FIELD AND DEPOT MAINTENANCE MANUAL

TELETYPEWRITER SETS AN/FGC–56 AND AN/FGC–58

(Chapters 1 and 2 and sections I through XVI of chapter 3 are contained in TM 11–5815–263–35/1.)

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Section XVII. ADJUSTMENT OF TYPING UNIT

236. General

This section contains the requirements and adjustment procedures for the typing unit. Adjustments are arranged in the proper sequence for a complete readjustment of the unit. When making an individual adjustment, check all related adjustments. When it is necessary to remove parts or assemblies in order to make an adjustment, reference is made to specific paragraphs for removal and replacement instructions.

a. Removal. Remove the typing unit as described in paragraph 79*a*.

b. Conditioning Operations. When the typing units has undergone a complete overhaul (disassembly, repair, and assembly), perform the following conditioning operations to prevent damage when making a complete readjustment of the unit, assuming that all adjustments do not meet the requirements:

(1) Loosen the code bar shift lever drive arm (fig. 220).

(2) Move the right and left vertical positioning lever eccentric studs in the main rocker shaft brackets (figs. 235 and 236) to their lowest position.

(3) Loosen the two bearing stud mounting screws and the two connecting strip clamp screws in the horizontal positioning mechanism (fig. 242).

(4) Loosen the clamp screws and move the right and left reversing side brackets to their uppermost position (fig. 241).

(5) Loosen the function reset bail blade mounting screws (fig. 242).

(6) Loosen the carriage return lever clamp screw (fig. 246).

(7) Loosen the clamp screws in the oscillating rail guide (fig. 237).

(8) Loosen the horizontal motion reversing slide adjusting stud (fig. (241).

(9) Loosen the figures-letters shift code bar upper guide plate mounting nuts (fig. 251).

c. Manual Selection of Characters or Functions. To manually operate the typing unit while removed from the keyboard base, proceed as follows:

(1) Insert the flat-formed end of the armature clip over the top of the selector magnet armature (fig. 210) between the pole pieces, and hook the extruded projection under the edge of the armature. Hook the top end of the clip over the top of the selector-magnet terminal bakelite guard. The spring tension of the clip will hold the armature in the marking (attracted) position.

(2) Place the universal handwheel (fig. 102) on the hub of the selector clutch drum (fig. 213) and tighten the handwheel mounting screw.

(3) Rotate the handwheel in a counterclockwise direction to bring all the clutches to their partially disengaged (stop) position. The clutches do not fully disengage upon reaching their stop position. To relieve the drag on the clutches and permit the main shaft to rotate freely, apply pressure on the stop lug of each clutch cam disk (fig. 213) with a screwdriver to cause it to engage its latch lever and thus fully disengage the internal expansion clutch.

(4) Release the selector armature momentarily to permit the selector clutch to engage.

(5) Turn the main shaft slowly until the No. 5 selector lever (fig. 218) has moved to the peak of its cam. Strip from the selector levers the push levers which are spacing in the code combination of the character or function that is being selected. Observe that the selector levers move in succession, starting with the inner (number one) selector lever. Continue to rotate the main shaft until all operations initiated by the selector action clear through the unit.

237. Selector Armature Adjustment
(fig. 209)

Note. To facilitate making the following adjustments, remove the range finder assembly and selector magnet assembly (par. 111*a*). To insure better operation pull a piece of clean bond paper between the selector armature and pole pieces to remove any oil or foreign matter that may be present. Make certain that no lint or pieces of paper remain between the pole pieces and selector armature.

a. Requirements.

(1) There should be .025- to .045-inch clearance between the armature clamp strip and casting (A).

(2) The outer edge of the armature should be flush within .015 inch with the outer edge of the pole pieces (B).

(3) The clearance between the sides of the armature backstop, and the sides of the armature extension (C) should not be less than .010 inch.

b. Method of Checking. Check requirements *a*(1) through (3) above with a round wire gage.

c. Adjustments

(1) Position the armature spring adjusting nut (A) to hold the armature firmly against the pivot edge of the casting.

(2) Loosen the armature mounting screws (C) and position the armature and backstop to obtain requirements *a*(1) through (3) above. Remount the range finder assembly and the selector magnet assembly (par. 111*d*). Check the related adjustments described in paragraphs 238 and 248.

238. Selector Magnet Bracket Adjustment
(fig. 210)

a. Requirements. When the selector armature is in contact with the front pole piece and the spacing lock lever is against a high part of its cam, the following requirements should be met:

(1) There should be .020- to .035-inch clearance between the end of the armature extension and shoulder of the spacing locking lever.

(2) There should be .001- to .003-inch clearance between the armature extension and lower surface of the spacing lock lever, when the lock lever is held downward.

b. Method of Checking. Measure the clearance specified in requirements *a*(1) and (2) above with feeler gages.

c. Adjustments.

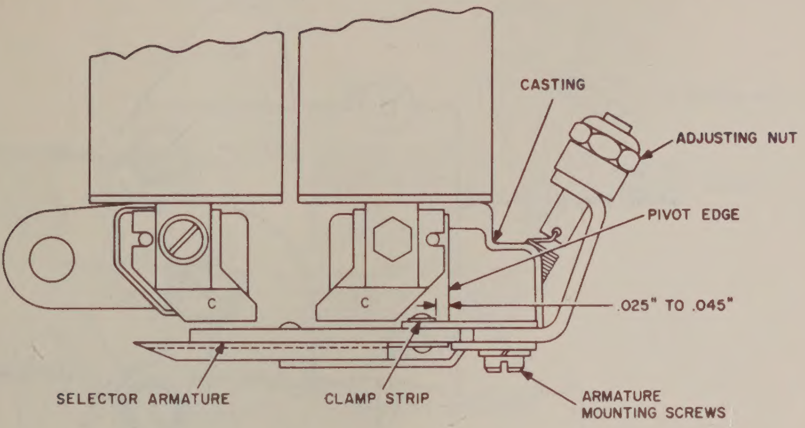
(1) Loosen the two magnet bracket mounting screws and the adjusting link clamp screw. Position the magnet bracket by means of the adjusting link to obtain the requirement specified in *a*(1) above, then tighten the link clamp screw only.

(2) Position the upper end of the magnet bracket to obtain the requirement specified in *a*(2) above. Tighten the magnet bracket mounting screws and recheck the requirement described in *a*(1) above. Check the related adjustment described in paragraph 248.

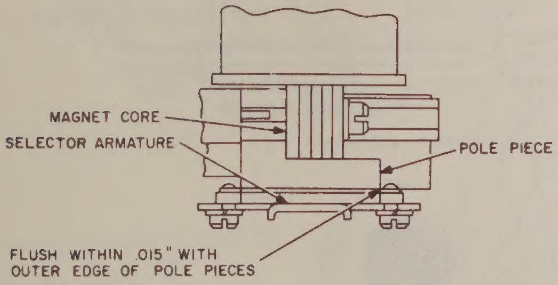
239. Selector Armature Spring Tension
(A, fig. 211)

Note. The selector armature spring tension can be adjusted for maximum performance only when the teletypewriter set is connected to the specific circuit over which it is to operate under normal service conditions. Since there are several operating speeds and since the circuits vary widely, the spring tension cannot be adjusted for maximum performance at this time. The spring tension requirements indicated below are to permit operation prior to measurement of receiving margins, when making distortion tolerance tests of the unit as described in paragraph 638*e*. Readjustment made to obtain satisfactory receiving margin should not be disturbed in order to meet the requirements of *a* below.

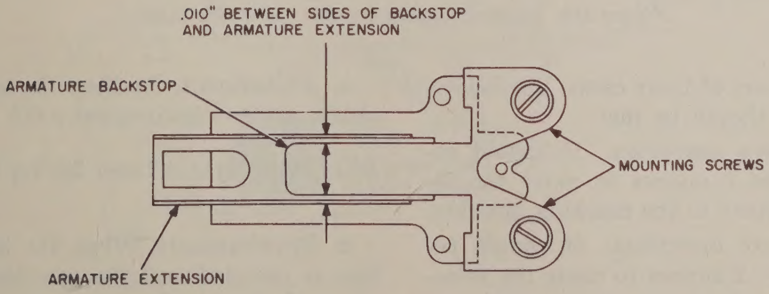
a. Requirements. When the marking lock lever, spacing lock lever, and start lever are


CASTING
ADJUSTING NUT
PIVOT EDGE
C
C
.025" TO .045"
SELECTOR ARMATURE
CLAMP STRIP
ARMATURE MOUNTING SCREWS

A. RIGHT SIDE VIEW


MAGNET CORE
SELECTOR ARMATURE
POLE PIECE
FLUSH WITHIN .015" WITH OUTER EDGE OF POLE PIECES

B. RIGHT END VIEW


.010" BETWEEN SIDES OF BACKSTOP AND ARMATURE EXTENSION
ARMATURE BACKSTOP
MOUNTING SCREWS
ARMATURE EXTENSION

C. BOTTOM VIEW

TM5815-264-35-19

Figure 209. Selector armature.

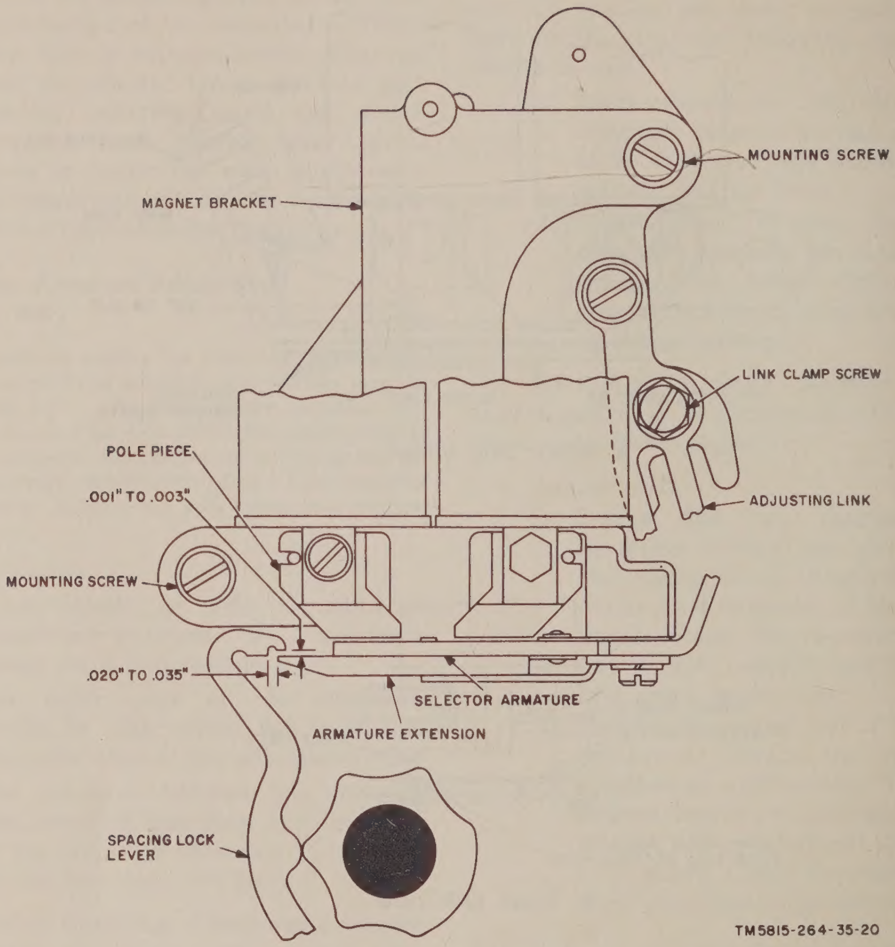

MOUNTING SCREW
MAGNET BRACKET
LINK CLAMP SCREW
POLE PIECE
.001" TO .003"
ADJUSTING LINK
MOUNTING SCREW
.020" TO .035"
SELECTOR ARMATURE
ARMATURE EXTENSION
SPACING LOCK LEVER
TM5815-264-35-20

Figure 210. Selector magnet bracket, right side view.

against the high part of their cams, the following requirements should be met:

(1) *0.060 ampere operation.* It should require 2½ to 3 ounces to move the selector armature to the marking position.

(2) *0.020 ampere operation.* It should require 1½ to 2 ounces to move the selector armature to the marking position.

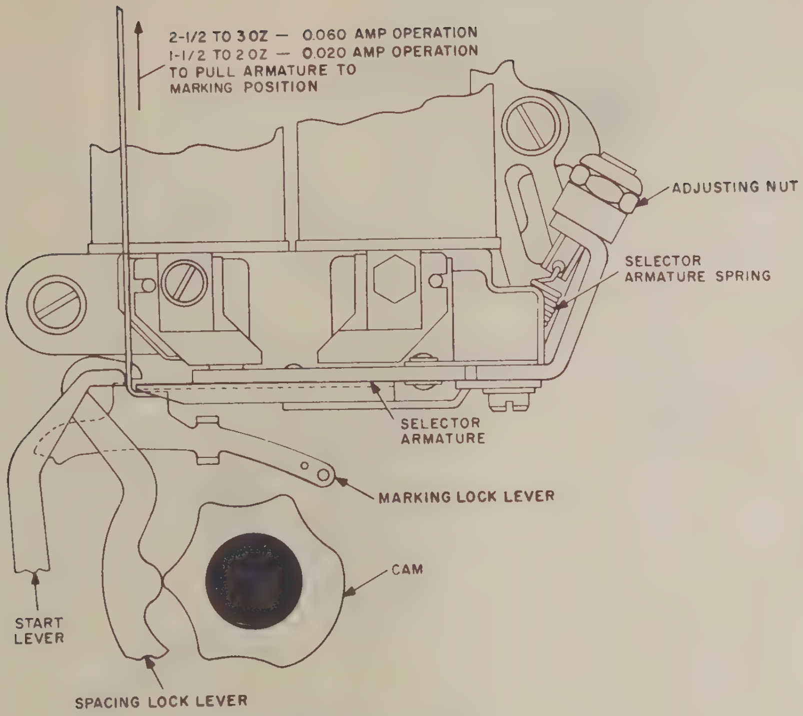
b. Method of Checking. Hook an 8-ounce scale over the end of the armature extension. Hold the scale as nearly vertical as possible when measuring the spring tension.

c. Adjustment. Position the adjusting nut to obtain either requirement *a*(1) or (2) above.

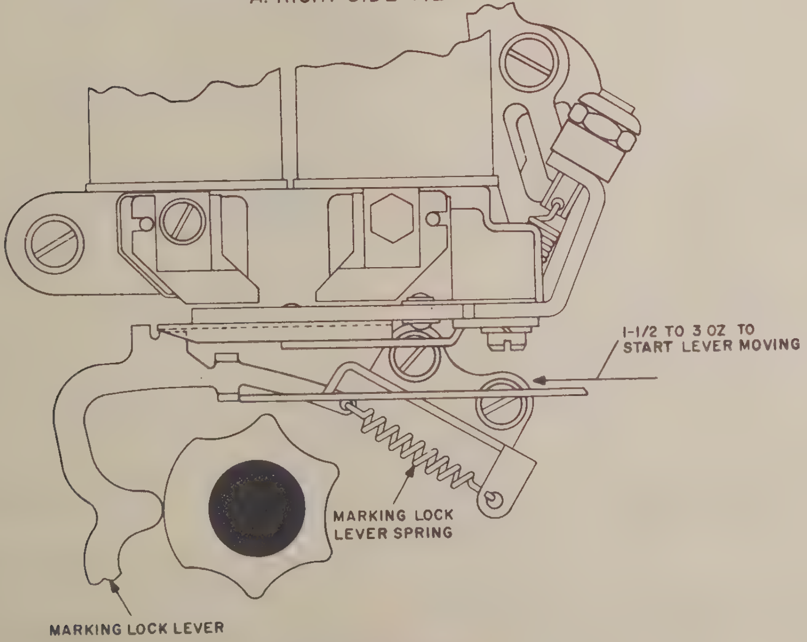
240. Marking Lock Lever Spring Tension
(B, fig. 211)

a. Requirements. When the letters combination is selected and the selector clutch is disengaged, it should require a push of 1½ to 3 ounces to start the marking lock lever moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the lower extension of the lock lever to obtain the requirement.


2-1/2 TO 3 OZ — 0.060 AMP OPERATION
1-1/2 TO 2 OZ — 0.020 AMP OPERATION
TO PULL ARMATURE TO MARKING POSITION
ADJUSTING NUT
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
MARKING LOCK LEVER
CAM
START LEVER
SPACING LOCK LEVER

A. RIGHT SIDE VIEW


1-1/2 TO 3 OZ TO START LEVER MOVING
MARKING LOCK LEVER SPRING
MARKING LOCK LEVER

B. RIGHT SIDE VIEW

TM5815-264-35-21

Figure 211. Selector armature spring and marking lock lever spring tensions.

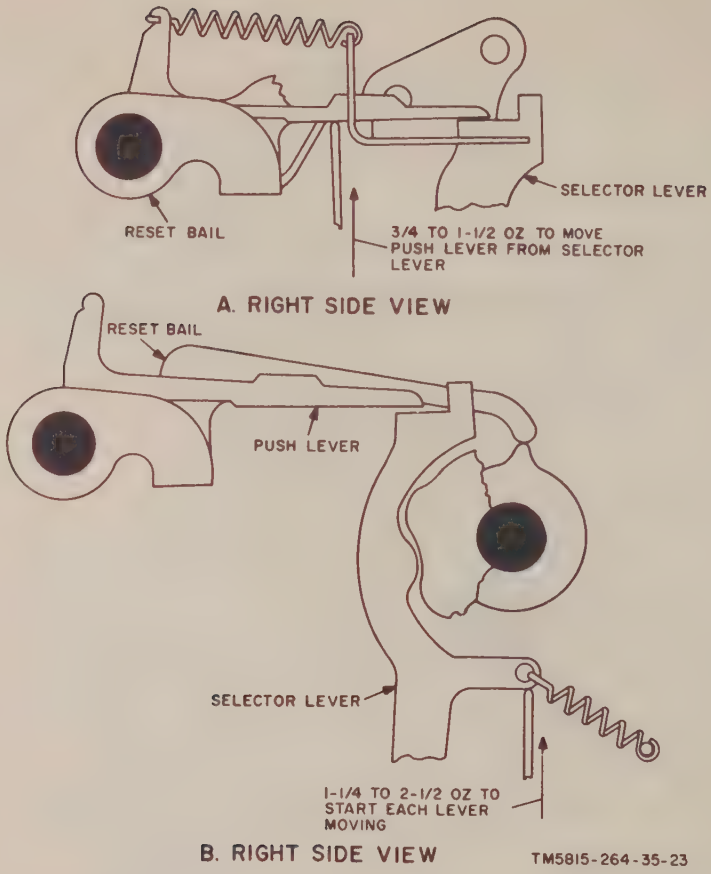

RESET BAIL
SELECTOR LEVER
3/4 TO 1-1/2 OZ TO MOVE PUSH LEVER FROM SELECTOR LEVER
A. RIGHT SIDE VIEW
RESET BAIL
PUSH LEVER
SELECTOR LEVER
1-1/4 TO 2-1/2 OZ TO START EACH LEVER MOVING
B. RIGHT SIDE VIEW
TM5815-264-35-23

Figure 212. Selector push lever spring and selector lever spring tensions.

c. Adjustment. Replace the marking lock lever spring if it fails to meet the requirement.

241. Selector Push Lever Spring Tension (A, fig. 212)

a. Requirement. When the push levers are in the spacing position, it should require ¾ to 1½ ounces to move each push lever from each selector lever.

b. Method of Checking. Set the typing unit upside down. Apply the push end of an 8-ounce scale to each push lever to obtain the requirement.

c. Adjustment. Replace any push lever spring that fails to meet the requirement.

242. Selector Lever Spring Tension (B, fig. 212)

a. Requirement. When the push lever reset bail is on the peak of its cam, it should require 1¼ to 2½ ounces to start each selector lever moving.

b. Method of Checking. Set the typing unit upside down. Apply the push end of an 8-ounce scale to each selector lever. If necessary, unhook the start lever spring (fig. 217) to check the No. 4 selector lever spring.

c. Adjustment. Replace any selector lever spring that fails to meet the requirement.

243. Selector Clutch Drum Adjustment (fig. 213)

a. Requirement. When the selector clutch is latched in the stopped position and the clutch drum is against the shoulder on the main shaft, the selector cam-clutch assembly should have .001- to .010-inch end play.

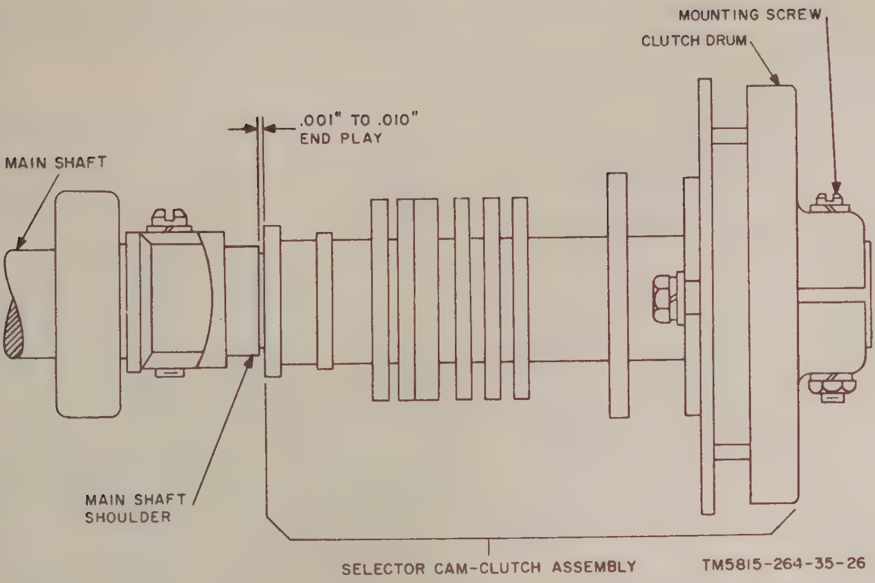

MOUNTING SCREW
CLUTCH DRUM
.001" TO .010" END PLAY
MAIN SHAFT
MAIN SHAFT SHOULDER
SELECTOR CAM-CLUTCH ASSEMBLY
TM5815-264-35-26

Figure 213. Selector clutch drum.

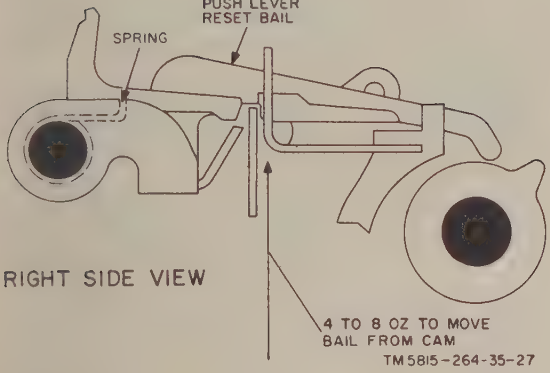

PUSH LEVER RESET BAIL
SPRING
RIGHT SIDE VIEW
4 TO 8 OZ TO MOVE BAIL FROM CAM
TM5815-264-35-27

Figure 214. Push lever reset bail spring tension.

b. Method of Checking. Check the clearance between the shoulder of the main shaft and the selector cam-clutch assembly with a feeler gage.

c. Adjustment. Loosen the clutch drum mounting screw and position the clutch drum to obtain the requirement; tighten the mounting screw.

244. Push Lever Reset Bail Spring Tension
(fig. 214)

a. Requirement. When the push lever reset

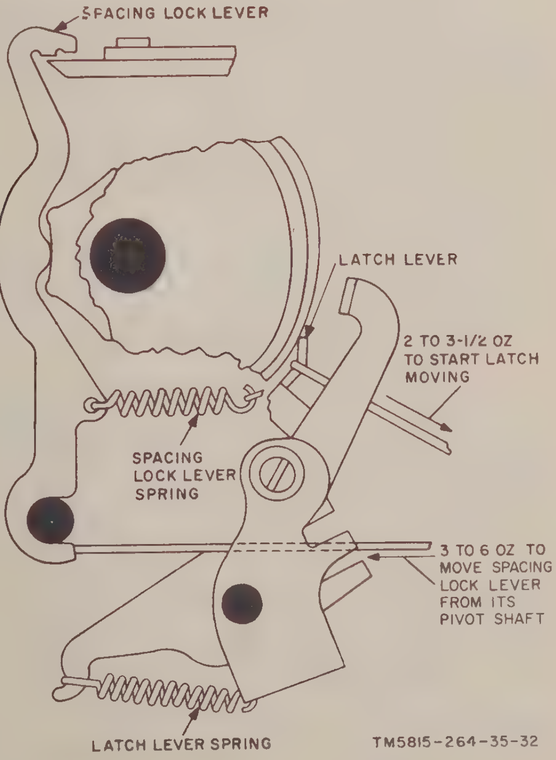

SPACING LOCK LEVER
LATCH LEVER
2 TO 3-1/2 OZ TO START LATCH MOVING
SPACING LOCK LEVER SPRING
3 TO 6 OZ TO MOVE SPACING LOCK LEVER FROM ITS PIVOT SHAFT
LATCH LEVER SPRING
TM5815-264-35-32

Figure 215. Selector clutch latch lever spring and spacing lock lever spring tension.

bail is against the low part of its cam, it should require a push of 4 to 8 ounces to move the push lever reset bail from its cam.

b. Method of Checking. Apply the push end of a 32-ounce scale to the reset bail.

c. Adjustment. Replace the push lever reset bail spring if it fails to meet the requirement.

245. Selector Clutch Latch Lever Spring Tension
(fig. 215)

a. Requirement. When the selector latch lever is against the low part of its cam, it should require 2 to 3½ ounces to start the selector clutch latch lever moving.

b. Method of Checking. Engage the latch lever with the hook end of an 8-ounce scale.

c. Adjustment. Replace the selector clutch latch lever spring if it fails to meet the requirement.

246. Spacing Lock Lever Spring Tension
(fig. 215)

a. Requirement. When the selector armature is released and the spacing lock lever is against the low part of its cam, it should require 3 to 6 ounces to move the spacing lock lever from its pivot shaft.

b. Method of Checking. Apply the push end of an 8-ounce scale to the lower end of the spacing lock lever.

c. Adjustment. Replace the spacing lock lever spring if it fails to meet the requirement.

247. Range Finder Knob Phasing Adjustment
(fig. 216)

a. Requirement. When the range finder knob is turned to either end of the rack, on the range finder sector, the zero mark on the scale should be within ±3 points of the scribed line on the range finder plate.

b. Adjustment. Remove the range finder knob mounting nut and disengage the knob from the rack. Position the knob to obtain the requirement, then re-engage the knob and rack. Replace and tighten the mounting nut.

248. Selector Clutch Stop Arm Adjustment
(fig. 216)

a. Requirement. With the range scale set at 60, the selector clutch disengaged, and the selector armature in the marking position, the clutch stop arm should engage the clutch shoe lever by approximately the full thickness of the shoe lever.

b. Adjustments. Loosen the clutch stop arm clamp screw and position the clutch stop arm on the stop arm bail to obtain the requirement; tighten the clamp screw.

249. Start Lever Spring Tension
(fig. 217)

a. Requirement. When the range scale is set at 60 and the stop arm bail is in an indent of its cam, it should require 2½ to 4½ ounces to start the clutch stop arm moving.

b. Method of Checking. Unhook the latch lever spring. Apply the push end of an 8-ounce scale to the clutch stop arm.

c. Adjustment. Replace the start lever spring if it fails to meet the requirement.

250. Common Transfer Lever Spring Tension
(A, fig. 218)

a. Requirement. When the common transfer lever is in the spacing position, it should require ½ to 1¼ ounces to start the common transfer lever moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the upper end of the common transfer lever.

c. Adjustment. Replace the common transfer lever spring if it fails to meet the requirement.

251. Transfer Lever Spring Tension
(A, fig. 218)

a. Requirement. When each transfer lever is held in the spacing position, it should require 1½ to 2½ ounces to start each intermediate arm moving.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the projection on each intermediate arm.

c. Adjustment. Replace any transfer lever spring that fails to meet the requirement.

252. Transfer Lever Eccentric Adjustment
(fig. 218)

a. Requirement. There should be .010- to .025-inch clearance between the rear code bar

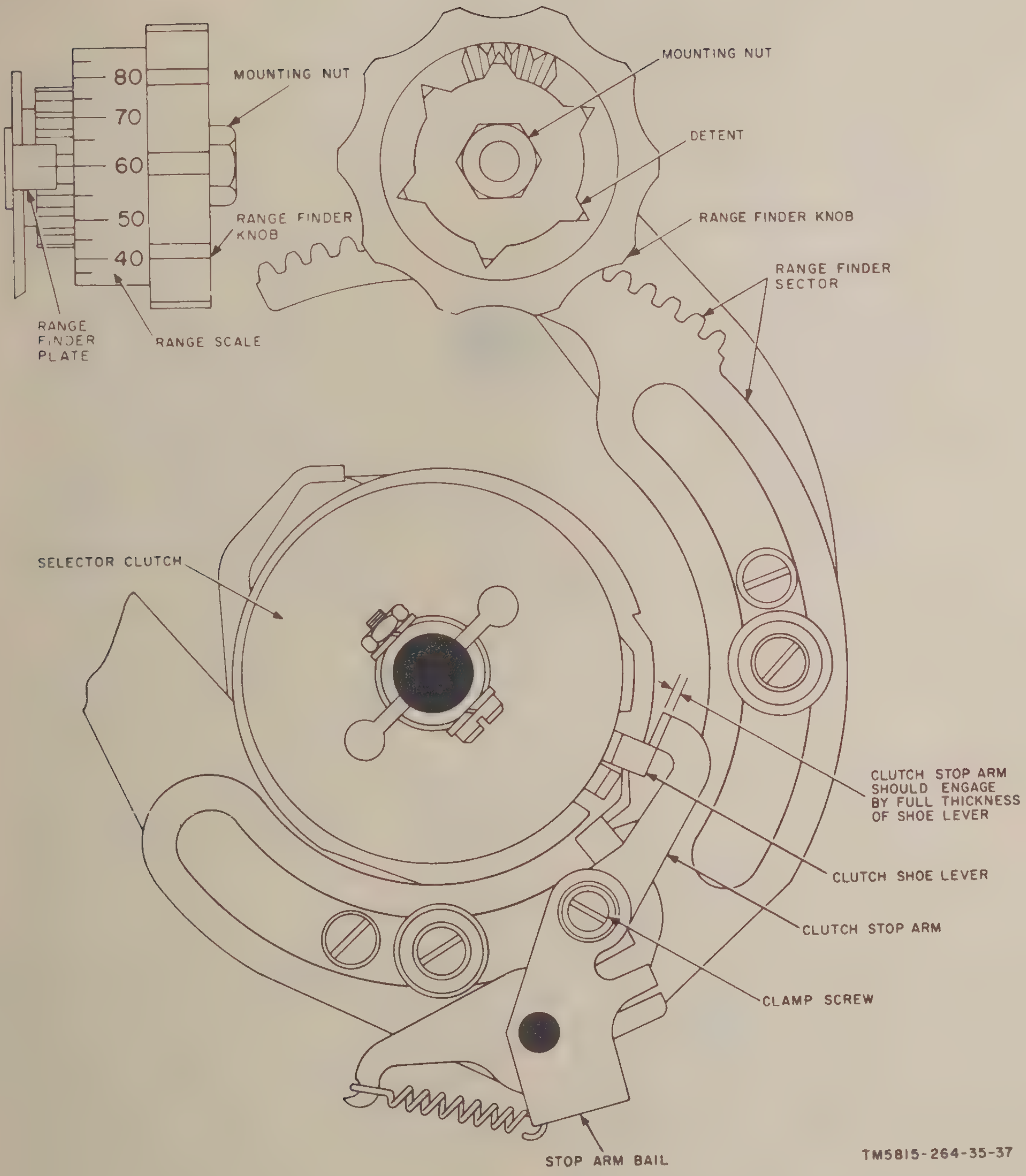

80
70
60
50
40
MOUNTING NUT
RANGE FINDER KNOB
RANGE FINDER PLATE
RANGE SCALE
MOUNTING NUT
DETENT
RANGE FINDER KNOB
RANGE FINDER SECTOR
SELECTOR CLUTCH
CLUTCH STOP ARM SHOULD ENGAGE BY FULL THICKNESS OF SHOE LEVER
CLUTCH SHOE LEVER
CLUTCH STOP ARM
CLAMP SCREW
STOP ARM BAIL
TM5815-264-35-37

Figure 216. Range finder knob phasing and selector clutch stop arm.

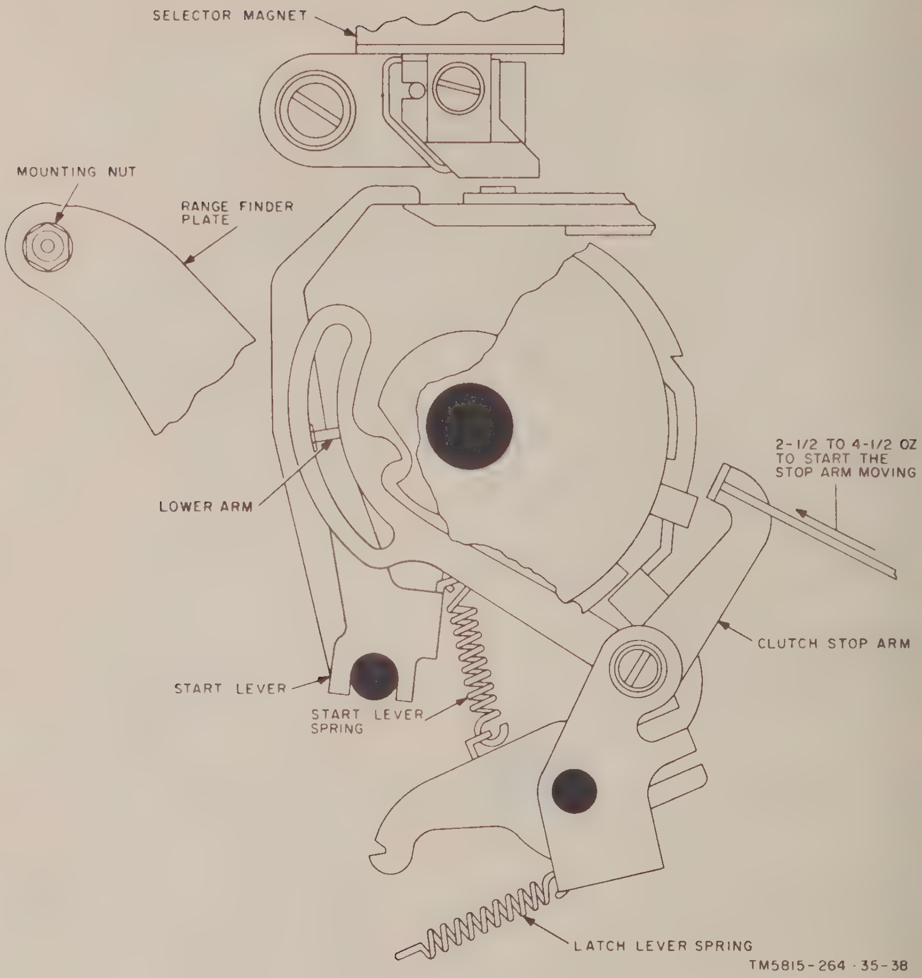

SELECTOR MAGNET
MOUNTING NUT
RANGE FINDER PLATE
2-1/2 TO 4-1/2 OZ TO START THE STOP ARM MOVING
LOWER ARM
CLUTCH STOP ARM
START LEVER
START LEVER SPRING
LATCH LEVER SPRING
TM5815-264-35-38

Figure 217. Start lever spring tension.

shift lever (B) and the code bar shift bar farthest from the rear code bar shift bar when play of the shift bar is taken up for maximum clearance.

b. Method of Checking. Check the clearance with a round wire gage under the following conditions:

(1) Push levers positioned for E, LINE FEED, or LTRS combination.
(2) Selector clutch disengaged.
(3) Code bar shift lever link in the uppermost position.

c. Adjustment. Loosen the eccentric bushing clamp screw (C). Rotate the eccentric bushing to obtain the requirement, and keep both holes in the eccentric bushing above the horizontal center. Tighten the bushing clamp screw. Check the related adjustments described in paragraphs 253 and 256.

253. Intermediate-Arm Backstop Bracket Adjustment

(fig. 219)

a. Requirement. There should be .010- to .025-inch clearance between the front code bar

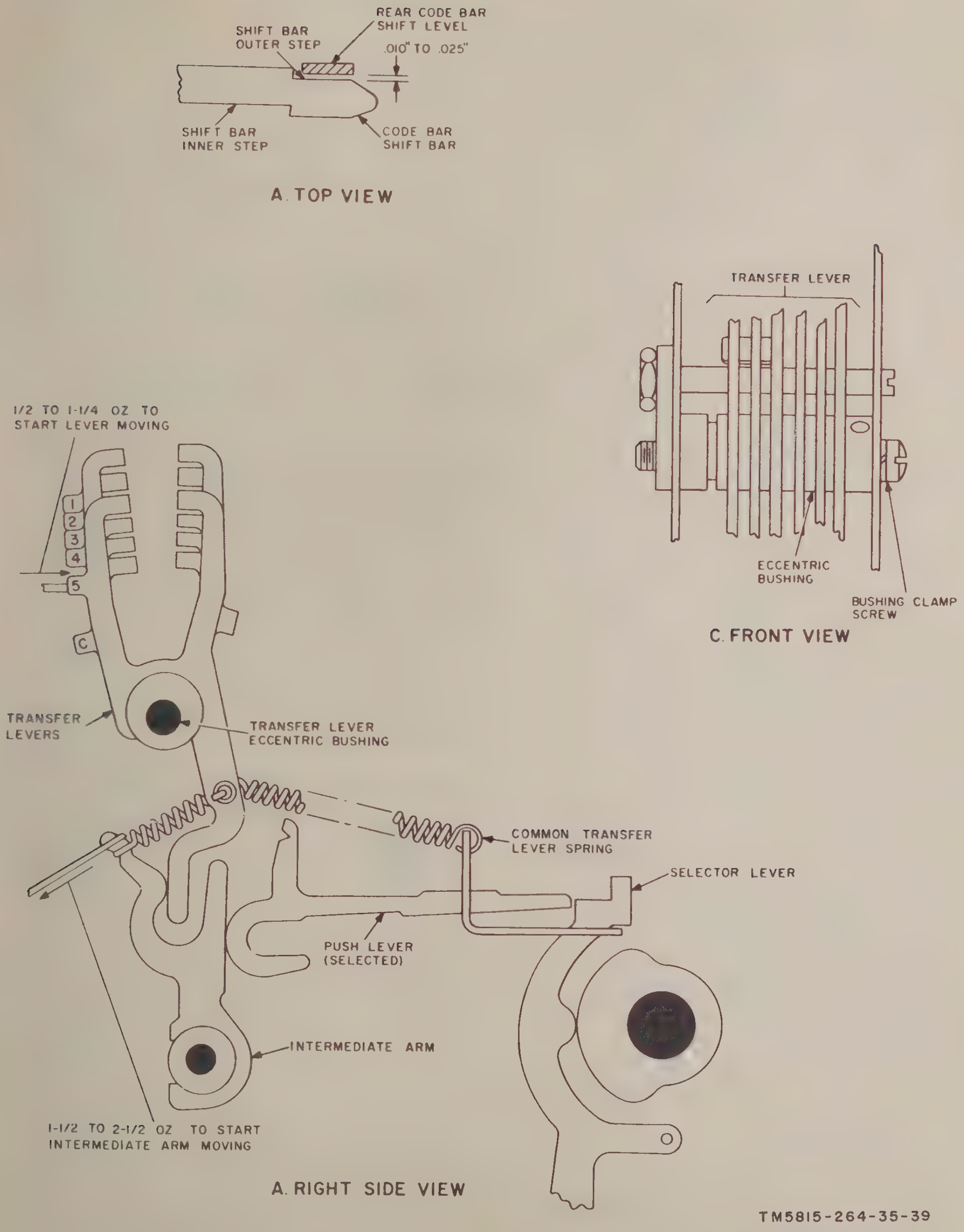
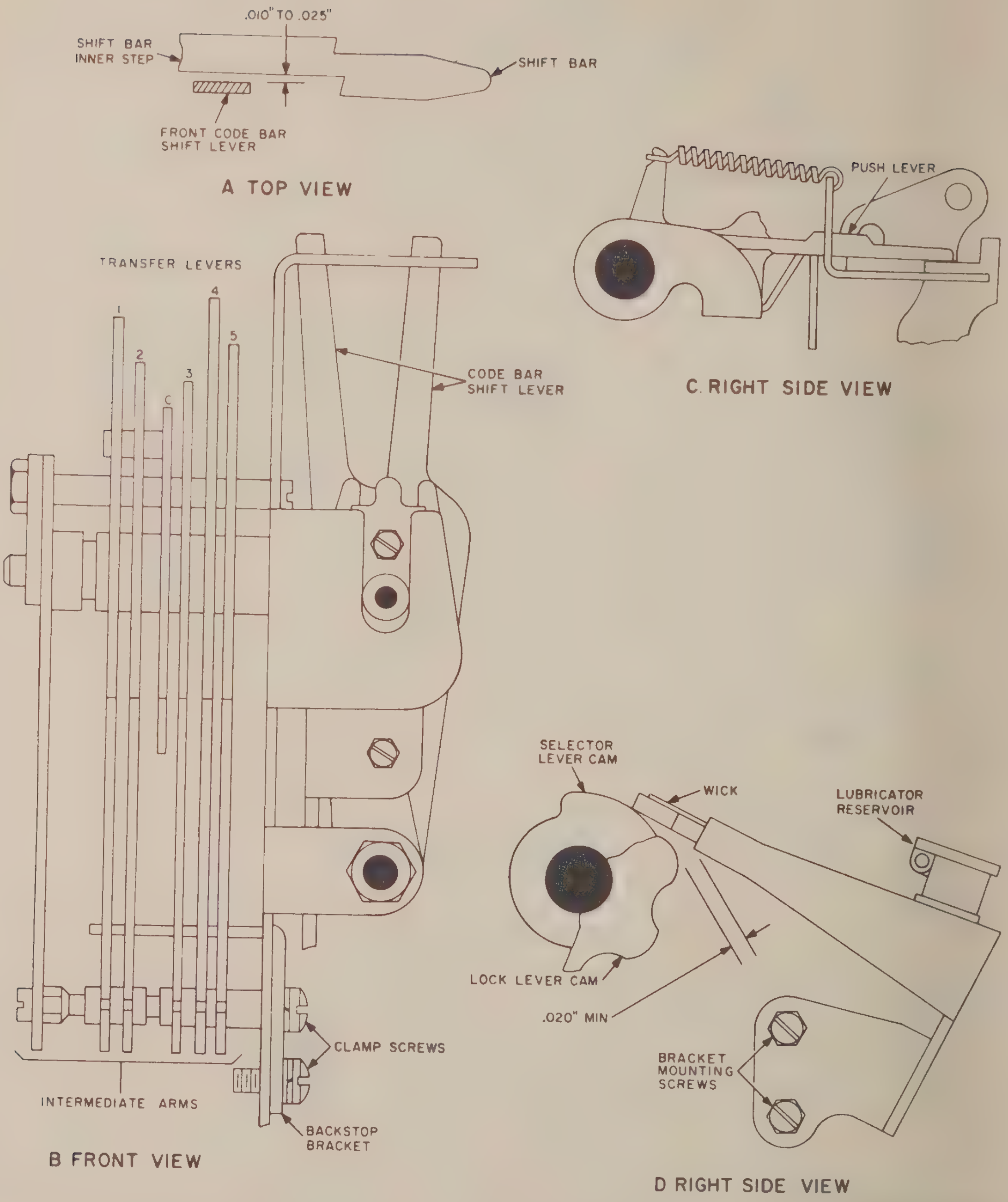

REAR CODE BAR SHIFT LEVEL
SHIFT BAR OUTER STEP
.010" TO .025"
SHIFT BAR INNER STEP
CODE BAR SHIFT BAR
A. TOP VIEW
TRANSFER LEVER
ECCENTRIC BUSHING
BUSHING CLAMP SCREW
C. FRONT VIEW
1/2 TO 1-1/4 OZ TO START LEVER MOVING
1
2
3
4
5
C
TRANSFER LEVERS
TRANSFER LEVER ECCENTRIC BUSHING
COMMON TRANSFER LEVER SPRING
SELECTOR LEVER
PUSH LEVER (SELECTED)
INTERMEDIATE ARM
1-1/2 TO 2-1/2 OZ TO START INTERMEDIATE ARM MOVING
A. RIGHT SIDE VIEW
TM5815-264-35-39

Figure 218. Code bar shift mechanism.


.010" TO .025"
SHIFT BAR INNER STEP
SHIFT BAR
FRONT CODE BAR SHIFT LEVER
A TOP VIEW
PUSH LEVER
C. RIGHT SIDE VIEW
TRANSFER LEVERS
1
2
C
3
4
5
CODE BAR SHIFT LEVER
CLAMP SCREWS
INTERMEDIATE ARMS
BACKSTOP BRACKET
B FRONT VIEW
SELECTOR LEVER CAM
WICK
LUBRICATOR RESERVOIR
LOCK LEVER CAM
.020" MIN
BRACKET MOUNTING SCREWS
D RIGHT SIDE VIEW

TM5815-264-35-41

Figure 219. Code bar shift mechanism intermediate-arm backstop bracket and selector cam lubricator.

shift lever (A) and inner step of the code bar shift bar farthest from the front code bar shift lever when play in the parts is taken up for maximum clearance.

b. Method of Checking. Check the clearance with a round wire gage under the following conditions:

(1) Push levers (C) not selected.
(2) All code bars shift bars to the right.
(3) Selector clutch disengaged.
(4) Code bar shift lever link in the lowermost position.

c. Adjustment. Loosen two clamp screws (B) and position the backstop bracket to obtain the requirement; tighten the clamp screws.

254. Selector Cam Lubricator Adjustment

(D, fig. 219)

a. Requirement.

(1) There should be a minimum clearance of .020 inch between the lubricator tube and the high part of the lock lever cam.
(2) The high part of the selector lever cams should touch the lubricator wick, but should not raise it by more than $\frac{1}{32}$ inch.

b. Adjustment. Loosen two mounting screws and position the lubricator bracket to obtain the requirement; tighten the mounting screws.

Note. There should be some clearance between the marking lock lever spring and the oil reservoir.

255. Code Bar Shift Lever Drive Arm Adjustment

(fig. 220)

a. Requirement. When the code bar shift lever link is in the uppermost position, there should be .001- to .025-inch clearance between the top of the rollers (A) and the top of the cam slots in the code bar shift levers on the closest lever.

b. Method of Checking. Check the clearance with a round wire gage.

c. Adjustment. Loosen the clamp screw (B). Position the code bar shift lever drive arm on its shaft to obtain the requirement and to provide some end play not to exceed .006 inch. Check the related adjustment described in paragraph 256.

256. Code Bar Shift Lever Link Bracket Adjustment

(fig. 221)

a. Requirements. The motion of the front and rear code bar shift levers should be equalized with respect to code bar travel.

(1) There should be .002- to .025-inch clearance between the front code bar shift lever (A) and shoulder on the nearest code bar shift bar.
(2) There should be .002- to .025-inch clearance between the rear code bar shift lever and shoulder on the nearest code bar shift bar.

b. Method of Checking.

(1) Check the requirement specified in *a*(1) above with a flat or round wire gage as follows:
  (*a*) Select the blank combination.
  (*b*) Rotate the main shaft until the code bar shift link reaches its highest travel.
  (*c*) Take up play in the front code bar shift lever for maximum clearance.
(2) Check the requirements specified in *a*(2) above with a flat or round wire gage as follows:
  (*a*) Select the LTRS combination.
  (*b*) Rotate the main shaft until the code bar shift lever reaches its highest travel.
  (*c*) Take up play in the rear code bar shift lever for maximum clearance.

c. Adjustments.

(1) Loosen the clamp screw (B) on the front adjusting plate. Position the adjusting plate to obtain the requirement specified in *a*(1) above; tighten the clamp screw.
(2) Loosen the clamp screw on the rear adjusting plate. Position the adjusting plate to obtain the requirement specified in *a*(2) above; tighten the clamp screw.

257. Clutch Latch Lever Spring Tension

(A, fig. 222)

Note. This spring tension adjustment is applicable to the code bar, function, spacing, line feed, and type box clutch latch lever springs. It does not apply to the selector clutch latch lever spring.

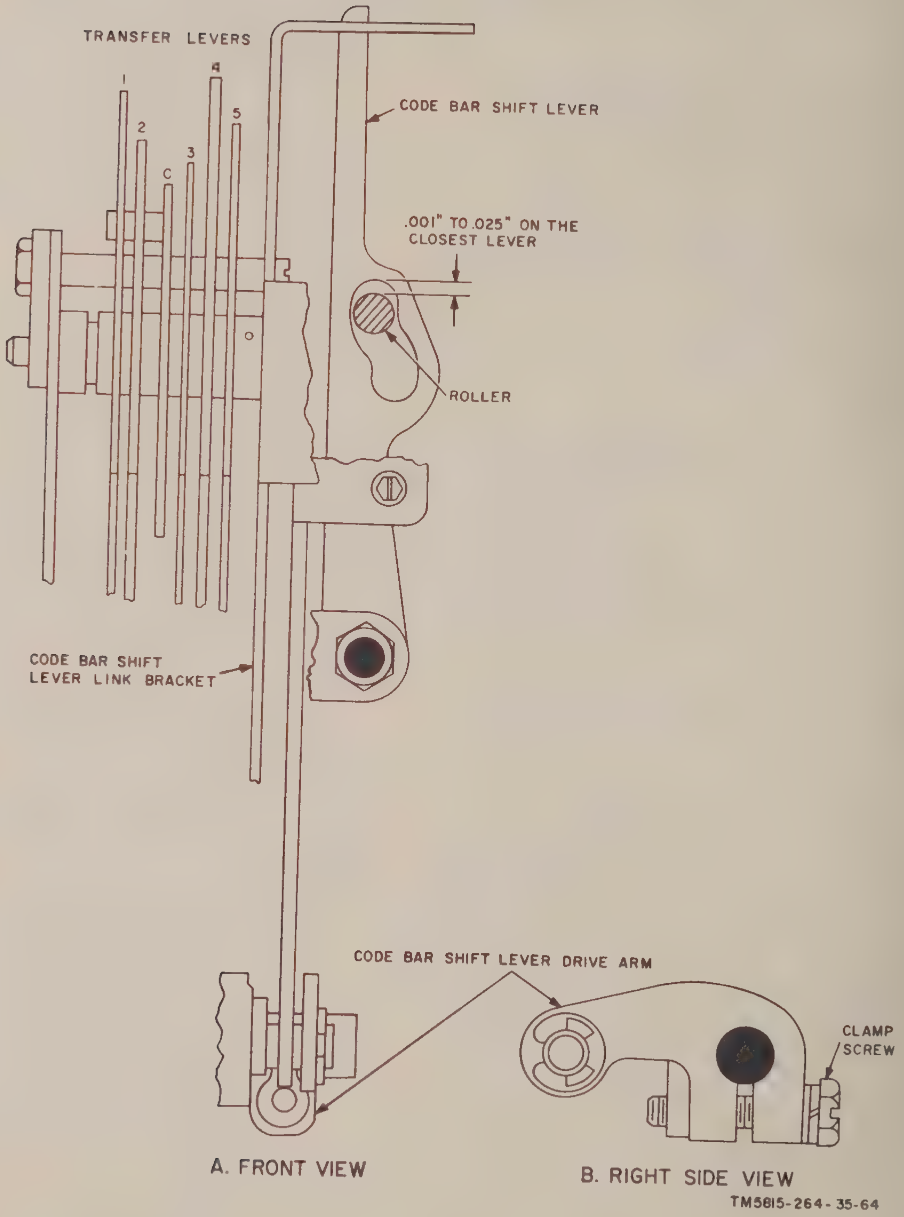
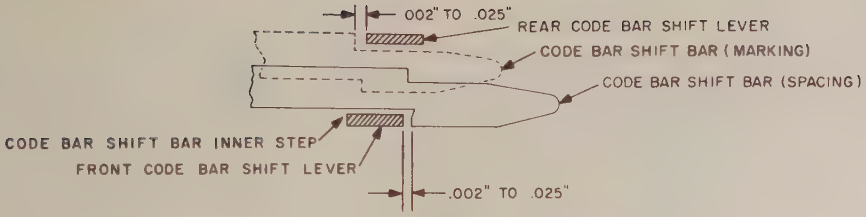
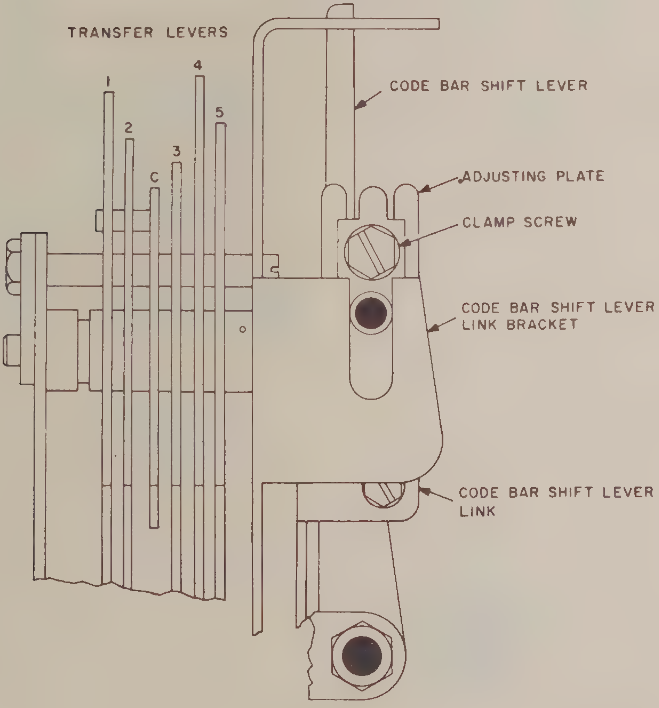

TRANSFER LEVERS
1
2
C
3
4
5
CODE BAR SHIFT LEVER
.001" TO .025" ON THE CLOSEST LEVER
ROLLER
CODE BAR SHIFT LEVER LINK BRACKET
CODE BAR SHIFT LEVER DRIVE ARM
CLAMP SCREW
A. FRONT VIEW
B. RIGHT SIDE VIEW
TM5815-264-35-64

Figure 220. Code bar shift lever drive arm.


.002" TO .025"
REAR CODE BAR SHIFT LEVER
CODE BAR SHIFT BAR (MARKING)
CODE BAR SHIFT BAR (SPACING)
CODE BAR SHIFT BAR INNER STEP
FRONT CODE BAR SHIFT LEVER
.002" TO .025"

A. TOP VIEW


TRANSFER LEVERS
1
2
C
3
4
5
CODE BAR SHIFT LEVER
ADJUSTING PLATE
CLAMP SCREW
CODE BAR SHIFT LEVER LINK BRACKET
CODE BAR SHIFT LEVER LINK

B. FRONT VIEW

TM5815-264-35-65

Figure 221. Code bar shift lever link bracket.

a. Requirement. When each clutch is turned to the stop position but with its associated latch lever unlatched, it should require 5 to 7¼ ounces to move each clutch latch lever (except the selector) from its stop lug.

b. Method of Checking. Apply the hook end of an 8-ounce scale to each latch lever.

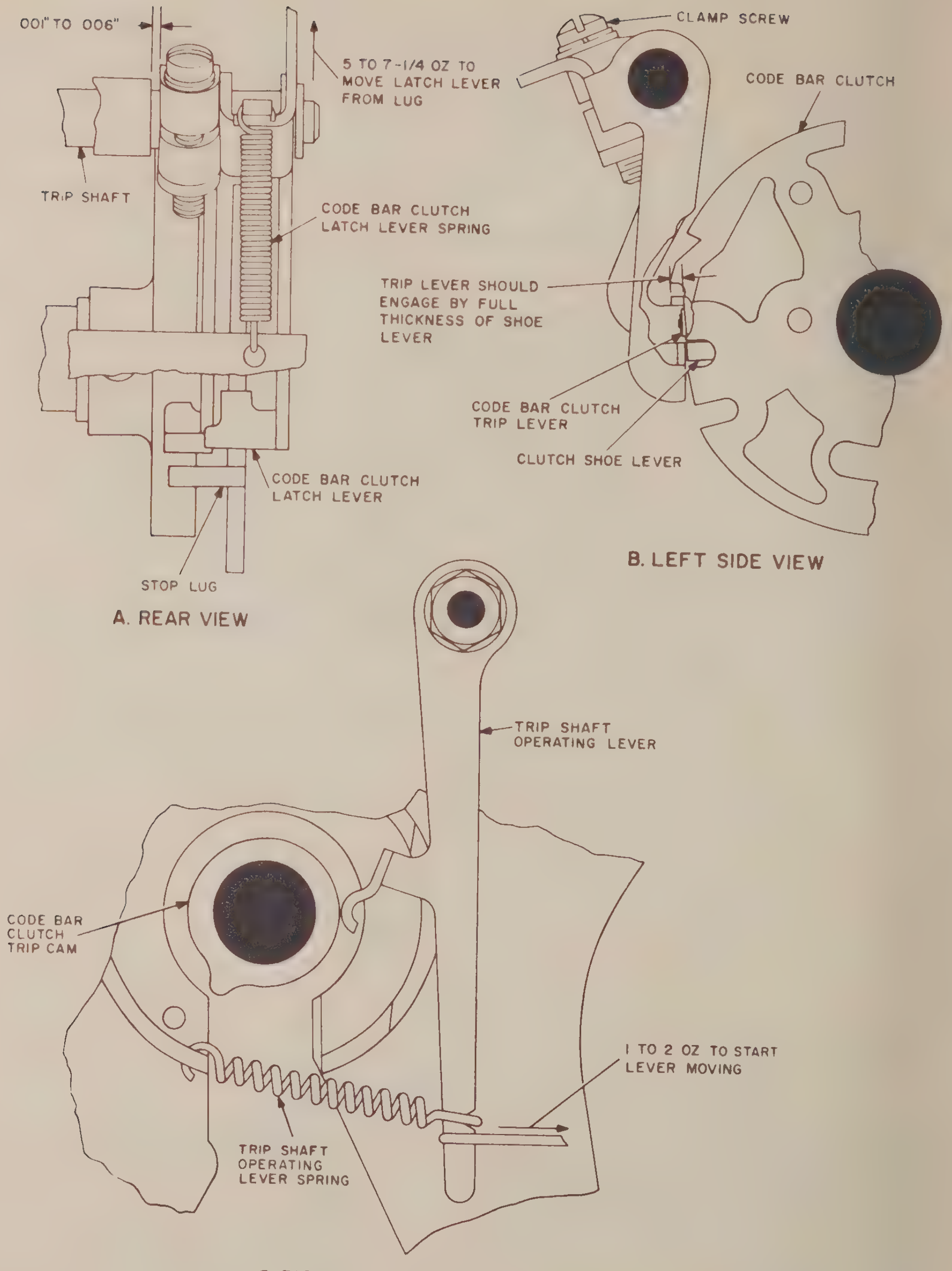
c. Adjustment. Replace clutch latch lever spring that fails to meet the requirement.

258. Code Bar Clutch Trip Lever Adjustment
(fig. 222)

a. Requirements.

(1) With the selector clutch and the code bar clutch disengaged, the code bar clutch trip lever (B) should engage the clutch shoe lever by the full thickness of the shoe lever.

(2) There should be .001- to .006-inch end


.001" TO .006"
5 TO 7-1/4 OZ TO MOVE LATCH LEVER FROM LUG
TRIP SHAFT
CODE BAR CLUTCH LATCH LEVER SPRING
CODE BAR CLUTCH LATCH LEVER
STOP LUG
CLAMP SCREW
CODE BAR CLUTCH
TRIP LEVER SHOULD ENGAGE BY FULL THICKNESS OF SHOE LEVER
CODE BAR CLUTCH TRIP LEVER
CLUTCH SHOE LEVER
TRIP SHAFT OPERATING LEVER
CODE BAR CLUTCH TRIP CAM
1 TO 2 OZ TO START LEVER MOVING
TRIP SHAFT OPERATING LEVER SPRING
TM5815-264-35-66

A. REAR VIEW

B. LEFT SIDE VIEW

C. RIGHT SIDE VIEW

Figure 222. Code bar clutch trip shaft mechanism.

play between the shoulder on the trip shaft (A) and the code bar clutch trip lever.

b. Adjustment. Loosen the clamp screw on the code bar clutch trip lever. Position the clutch trip lever on its shaft to obtain the requirements described in *a*(1) and (2) above; tighten the clamp screw.

259. Trip Shaft Lever Spring Tension
(C, fig. 222)

a. Requirement. When the trip shaft operating lever is against the low part of the code bar clutch trip cam, it should require a pull of 1 to 2 ounces to start the trip shaft operating lever moving.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the trip shaft operating lever.

c. Adjustment. Replace the trip shaft operating lever spring if it fails to meet the requirement.

260. Code Bar Clutch Cam Follower Arm Spring Tension
(C, fig. 223)

a. Requirement. When the follower arm roller is against the low part of the code bar clutch cam, it should require 20 to 24 ounces to pull the code bar clutch cam follower arm spring to its installed length.

b. Method of Checking. Unhook the follower arm spring from the bearing bracket. Apply the hook end of a 32-ounce scale to the loop end of the spring to measure the requirement; install spring on bearing bracket.

c. Adjustment. Replace the clutch cam follower arm spring if it fails to meet the requirement.

261. Function Clutch Trip Lever Adjustment
(fig. 223)

a. Requirements.

(1) With the code bar clutch and the function clutch disengaged, with clutch shoe lever (B) should engage the clutch shoe lever by the full thickness of the shoe lever.

(2) The trip shaft should have .001- to .006-inch end play between the bearing bracket (A) and the function clutch trip lever.

b. Adjustment. Loosen the clamp screw on the function clutch trip lever. Position the trip lever on its shaft to obtain the requirements described in *a*(1) and (2) above; tighten the clamp screw.

262. Clutch Trip Shaft Set Collars Adjustment
(fig. 224)

a. Requirements.

(1) The spacing clutch latch lever (A), should have .001- to .008-inch side play.

(2) There should be an approximate alinement of the right hand end of the stop extension on the line feed clutch trip lever (B), and the right hand end of the clutch shoe lever.

(3) The line feed clutch latch lever (B), should have .001- to .008-inch side play.

b. Method of Checking.

(1) Check the requirement described in *a*(1) above with a flat wire gage.

(2) Hold the line feed clutch trip lever against the line feed set collar to check the requirement described in *a*(2) above.

(3) Check the requirement described in *a*(3) above with a flat wire gage.

c. Adjustments.

(1) Loosen the mounting screw on the spacing clutch latch lever set collar (A). Position the collar to obtain the requirement specified in *a*(1) above; tighten the mounting screw.

(2) Loosen the mounting screw on the line feed clutch trip lever set collar (B). Position the collar to obtain the requirement specified in *a*(2) above; tighten the mounting screw.

(3) Loosen the mounting screw on the line feed clutch latch lever set collar. Position the collar to obtain the requirement specified in *a*(3) above; tighten the mounting screw.

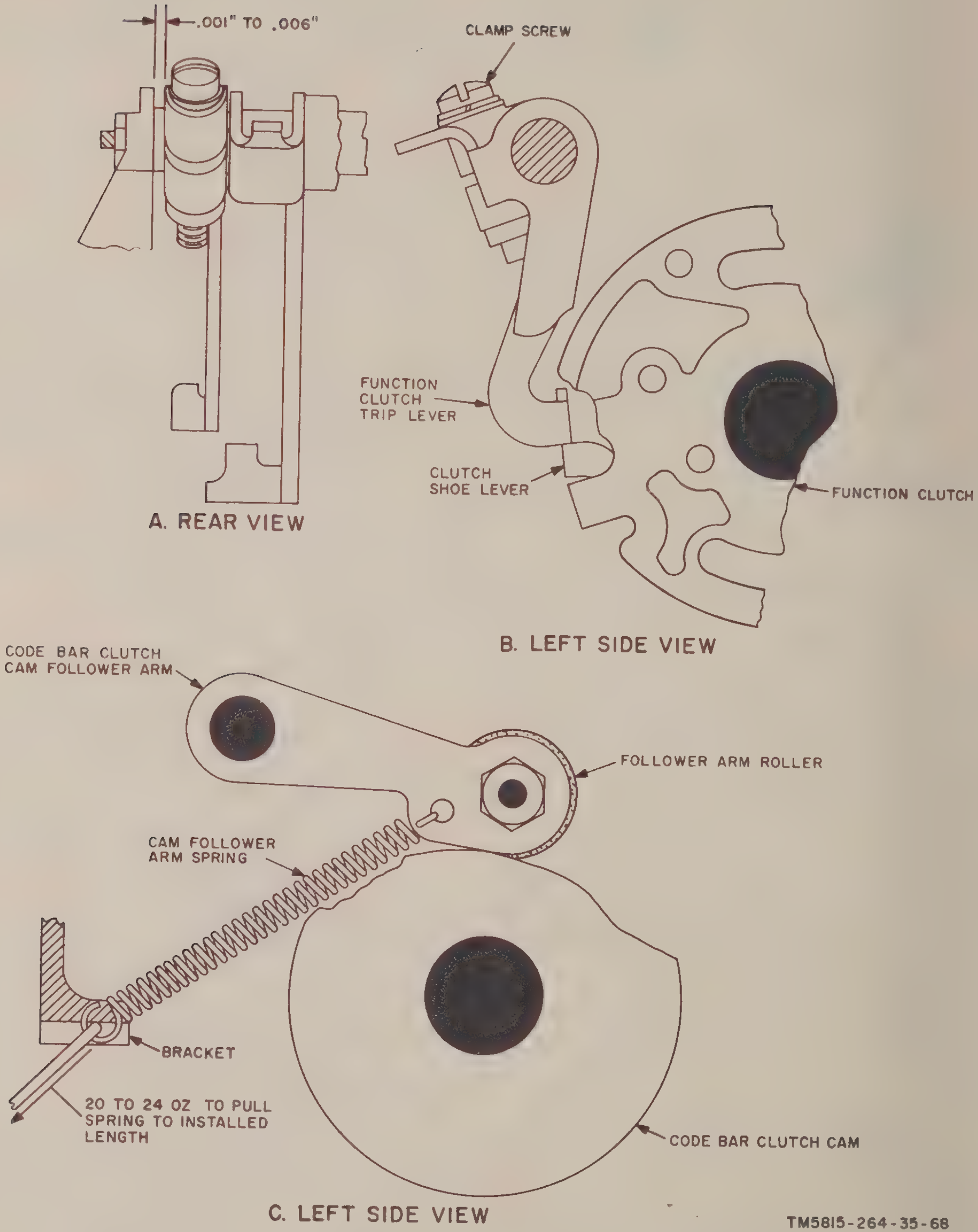
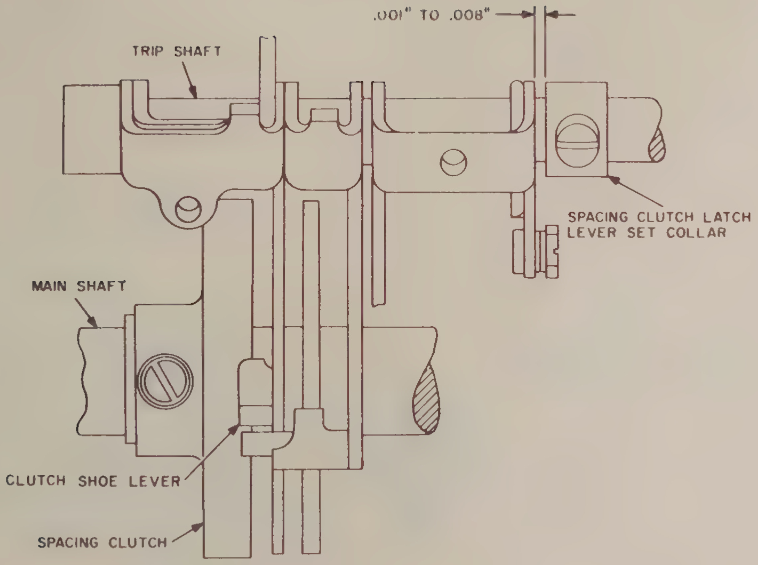
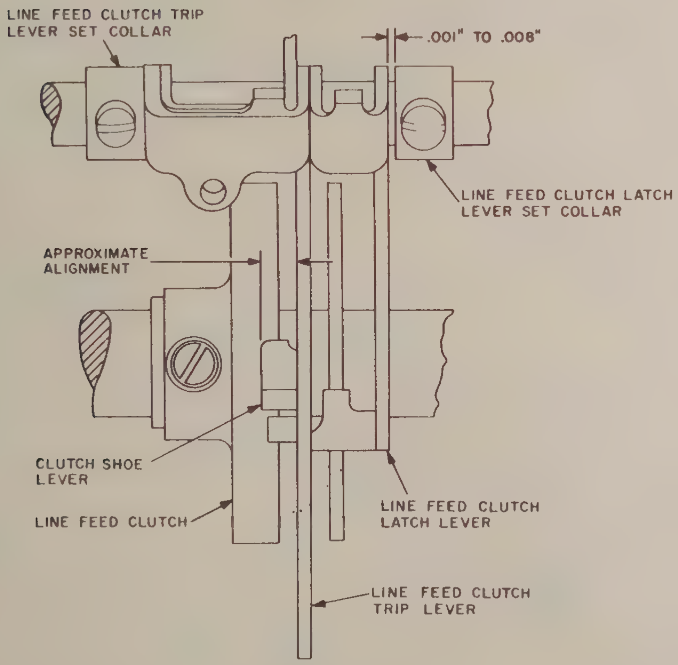

.001" TO .006"
CLAMP SCREW
A. REAR VIEW
FUNCTION CLUTCH TRIP LEVER
CLUTCH SHOE LEVER
FUNCTION CLUTCH
B. LEFT SIDE VIEW
CODE BAR CLUTCH CAM FOLLOWER ARM
FOLLOWER ARM ROLLER
CAM FOLLOWER ARM SPRING
BRACKET
20 TO 24 OZ TO PULL SPRING TO INSTALLED LENGTH
CODE BAR CLUTCH CAM
C. LEFT SIDE VIEW
TM5815-264-35-68

Figure 223. Function clutch mechanism.


.001" TO .008"
TRIP SHAFT
SPACING CLUTCH LATCH LEVER SET COLLAR
MAIN SHAFT
CLUTCH SHOE LEVER
SPACING CLUTCH

A. REAR VIEW


LINE FEED CLUTCH TRIP LEVER SET COLLAR
.001" TO .008"
LINE FEED CLUTCH LATCH LEVER SET COLLAR
APPROXIMATE ALIGNMENT
CLUTCH SHOE LEVER
LINE FEED CLUTCH
LINE FEED CLUTCH LATCH LEVER
LINE FEED CLUTCH TRIP LEVER

B. REAR VIEW

TM5815-264-35-70

Figure 224. Trip latch mechanism.

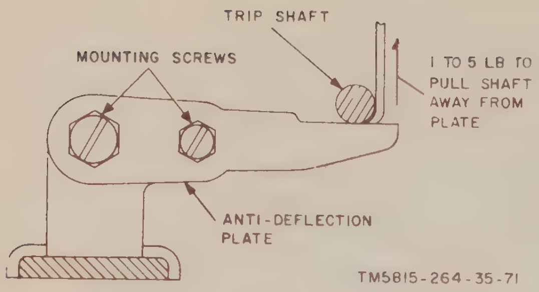


Figure 225. Anti-deflection plate, left side view, upside down.

263. Anti-Deflection Plate Adjustment
(fig. 225)

a. Requirement. When the function, spacing, line feed, and type box clutches are disengaged and latched in the stopped position, it should require 1 to 5 pounds to pull the trip shaft away from the anti-deflection plate.

b. Method of Checking. Set the typing unit upside down. Hook a 12 pound scale under the trip shaft next to the anti-deflection plate. Pull perpendicular to the plate.

c. Adjustment. Loosen the two mounting screws on the anti-deflection plate. Position the plate to obtain the requirement; tighten the mounting screws.

264. Spacing Clutch Trip Lever Adjustment
(fig. 226)

a. Requirement.

(1) The clearance between the spacing clutch trip lever and clutch drum should be .018- to .035-inch less than the clearance between the clutch shoe lever and clutch drum at the stop lug which shows the greatest clearance.

(2) There should be some overbite on all three stop lugs as gaged by eye.

b. Method of Checking.

(1) Checking the requirement described in *a*(1) above as follows:

(*a*) Disengage the spacing clutch.

(*b*) Trip the spacing clutch trip lever and rotate the main shaft until the trip lever is over the clutch shoe lever.

(*c*) Take up the play in the clutch shoe lever inward by snapping the trip lever over the clutch shoe lever.

(*d*) Measure and record the clearance between the clutch drum and show lever.

(*e*) Perform (*a*) through (*d*) above on the other two clutch stops.

(*f*) With the spacing clutch trip lever at the stop position which shows the greatest clearance, rotate the main shaft slowly until the trip lever just falls off the stop lug. Check the clearance between the trip lever and drum.

(2) Check the requirement described in *a*(2) as follows:

(*a*) Rotate the main shaft and place the spacing clutch in the stop position.

(*b*) Check for some overbite on the stop lug.

(*c*) Repeat (*a*) and (*b*) above at each of the other two stops.

c. Adjustment. Loosen the clamp screw on the spacing clutch trip lever. Position the trip lever to obtain the requirements described in *a*(1) and (2) above; tighten the clamp screw.

265. Clutch Trip Lever Spring Tension
(fig. 226)

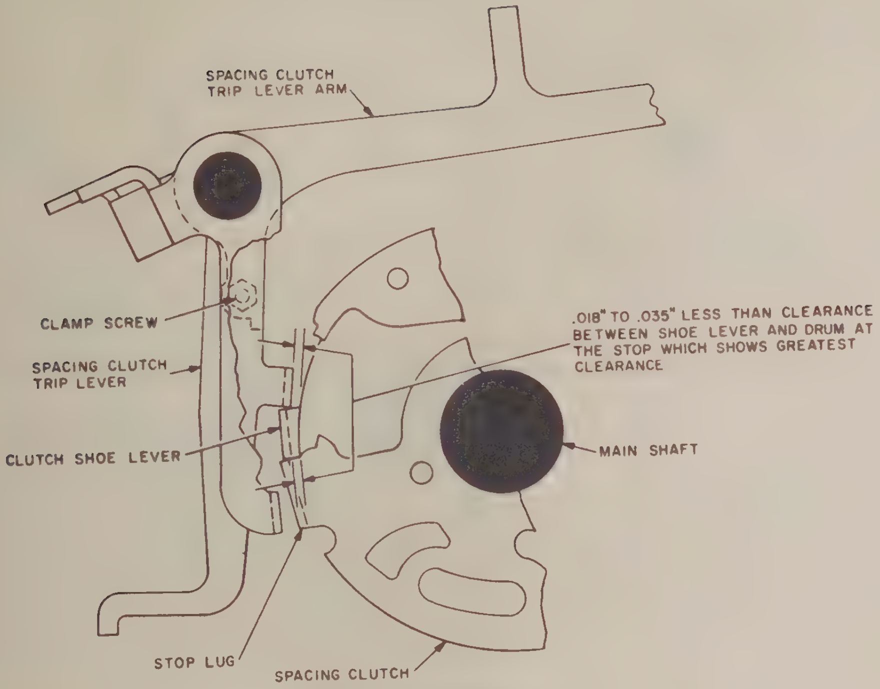
Note. The requirements specified below apply to the spacing, line feed, and type box clutch trip lever spring tension adjustments. Since the method of checking is the same for each spring, only the spacing clutch trip lever spring is shown on the illustration.

a. Requirement. When each clutch is engaged and rotated until the associated trip lever is resting on its stop lug, the following requirements should be met:

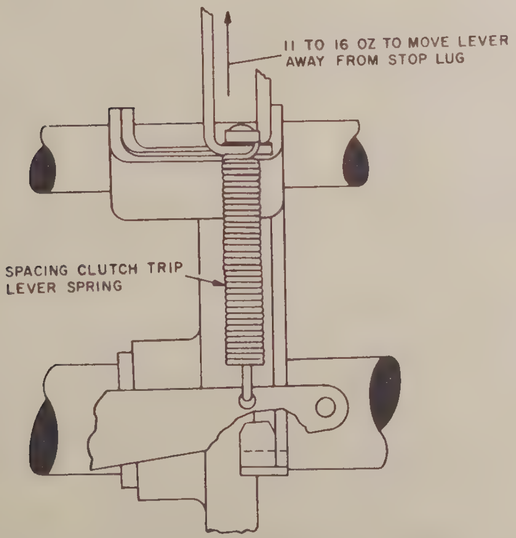
(1) It should require a pull of 11 to 16 ounces to move the spacing clutch trip lever away from its shop lug.

(2) It should require a pull of 9 to 12 ounces to start the line feed clutch trip lever away from its stop lug.

(3) It should require a pull of 5 to 7¼ ounces to start the type box clutch trip lever away from its stop lug.


SPACING CLUTCH TRIP LEVER ARM
CLAMP SCREW
SPACING CLUTCH TRIP LEVER
CLUTCH SHOE LEVER
.018" TO .035" LESS THAN CLEARANCE BETWEEN SHOE LEVER AND DRUM AT THE STOP WHICH SHOWS GREATEST CLEARANCE
MAIN SHAFT
STOP LUG
SPACING CLUTCH

A. LEFT SIDE VIEW


11 TO 16 OZ TO MOVE LEVER AWAY FROM STOP LUG
SPACING CLUTCH TRIP LEVER SPRING

B. REAR VIEW

TM5815-264-35-80

Figure 226. Spacing clutch trip lever.

b. Method of Checking. Apply the hook end of the proper size spring scale over the trip lever spring extension and pull in line with the spring.

c. Adjustment. Replace any clutch trip lever spring that fails to meet the requirement.

266. Line Feed Clutch Trip Lever Eccentric Post Adjustment
(fig. 227)

a. Requirement. When the line feed clutch is in the stop position, the line feed clutch trip lever should engage the clutch shoe lever by the full thickness of the shoe lever.

b. Method of Checking. Loosen the retaining nut on the line feed clutch trip lever adjusting screw. Back off the adjusting screw, then tighten the retaining nut. Check the requirement at the stop lug with the least bite.

c. Adjustment. Loosen the retaining nut on the line feed clutch trip lever eccentric post. Position the eccentric post to obtain the requirement; tighten the retaining nut. Check the related adjustments described in paragraphs 267 and 268.

267. Line Feed Clutch Trip Lever Adjustment
(fig. 227)

a. Requirement.

(1) The clearance between the line feed clutch trip lever and clutch drum should be .018- to .035-inch less than the clearance between the clutch shoe lever and clutch drum at the stop lug which shows the greatest bite.

(2) There should be some overbite on all three stop lugs as gaged by eye.

b. Method of Checking.

(1) Check the requirement described in *a*(1) above as follows:

(*a*) Disengage the line feed clutch.

(*b*) Trip the line feed clutch trip lever and rotate the main shaft until the trip lever is over the clutch shoe lever.

(*c*) Take up the play in the shoe lever inward by snapping the trip lever over the shoe lever.

(*d*) Measure and record the clearance between the clutch drum and shoe lever.

(*e*) Perform (*a*) through (*d*) above on the other two clutch stops.

(*f*) With the line feed clutch trip lever at the stop position which shows the greatest clearance, rotate the main shaft slowly until the trip lever just falls off the stop lug. Check the clearance between the trip lever and drum.

(2) Check the requirement described in *a*(2) above as follows:

(*a*) Rotate the main shaft and place the line feed clutch in the stop position.

(*b*) Check for some overbite on the stop lug.

(*c*) Repeat (*a*) and (*b*) above at each of the other two stops.

c. Adjustment. Loosen the retaining nut on the trip lever adjusting screw, and the retaining nut on the trip lever eccentric post. Back off the adjusting screw and position the trip lever eccentric post to obtain the requirements described in *a*(1) and (2) above, tighten the retaining nuts. Check the related adjustment described in paragraph 268.

268. Line Feed Clutch Trip Lever Adjusting Screw Adjustment
(fig. 227)

a. Requirement. When the line feed slide arm is in the rear position, and the line feed clutch trip lever is against the trip lever eccentric post, there should be .001- to .006-inch clearance between the end of the trip lever adjusting screw and the trip arm.

b. Method of Checking. Check the clearance with a flat wire gage.

c. Adjustment. Loosen the retaining nut on the trip lever adjusting screw. Position the adjusting screw to obtain the requirement; tighten the retaining screw. Check the related adjustments described in paragraphs 266 and 267.

269. Type Box Clutch Trip Lever Eccentric Post Adjustment
(A, fig. 228)

a. Requirement. When the type box clutch

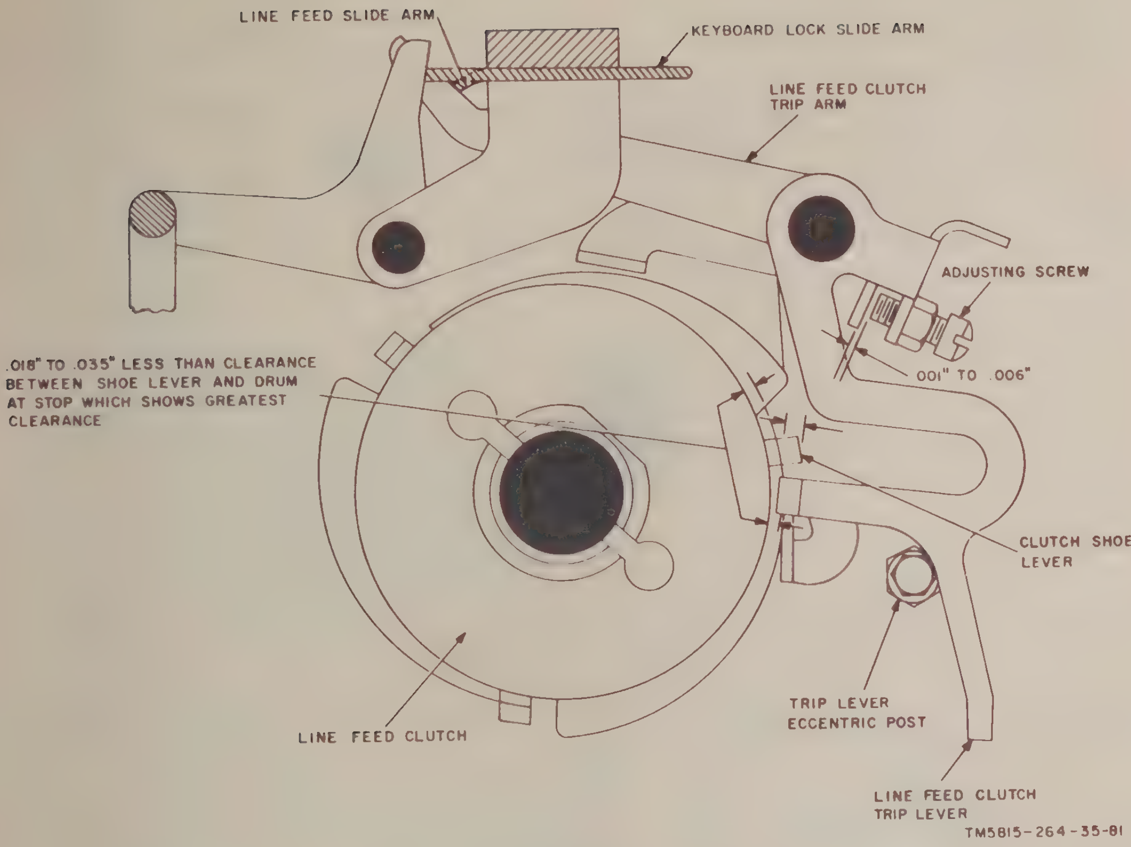

LINE FEED SLIDE ARM
KEYBOARD LOCK SLIDE ARM
LINE FEED CLUTCH TRIP ARM
ADJUSTING SCREW
.018" TO .035" LESS THAN CLEARANCE BETWEEN SHOE LEVER AND DRUM AT STOP WHICH SHOWS GREATEST CLEARANCE
.001" TO .006"
CLUTCH SHOE LEVER
TRIP LEVER ECCENTRIC POST
LINE FEED CLUTCH
LINE FEED CLUTCH TRIP LEVER
TM5815-264-35-81

Figure 227. Line feed clutch mechanism.

is disengaged, the type box clutch trip lever should engage the clutch shoe lever by the full thickness of the shoe lever.

b. Adjustment. Loosen the retaining nut on the trip lever eccentric post. Position the eccentric post to obtain the requirement; tighten the retaining nut.

270. Type Box Clutch Trip Lever Adjustment

a. Requirement. When the follower arm roller (C, fig. 223) is on the lowest surface of the code bar clutch (located on the code bar clutch), the following requirements should be met:

(1) There should be .045- to .080-inch clearance between the inner face of the type box clutch trip lever (C, fig. 228), and the clutch cam disk stop lug.

(2) The type box clutch latch lever (B) should have .001- to .008-inch side play.

b. Method of Checking. Check the requirements described in (1) and (2) above with a round wire or flat feeler gage.

c. Adjustment. Loosen the clamp screw on the type box clutch trip arm (C, fig. 228). Position the trip arm on its shaft to obtain the requirements described in *a*(1) and (2) above; tighten the clamp screw.

271. Clutch Shoe Lever Adjustment
(fig. 229)

Note. This adjustment is applicable to the selector, code bar, function, spacing, linefeed, and type box clutch shoe levers.

a. Requirement. The gap between the clutch shoe lever and its stop lug should be .055- to

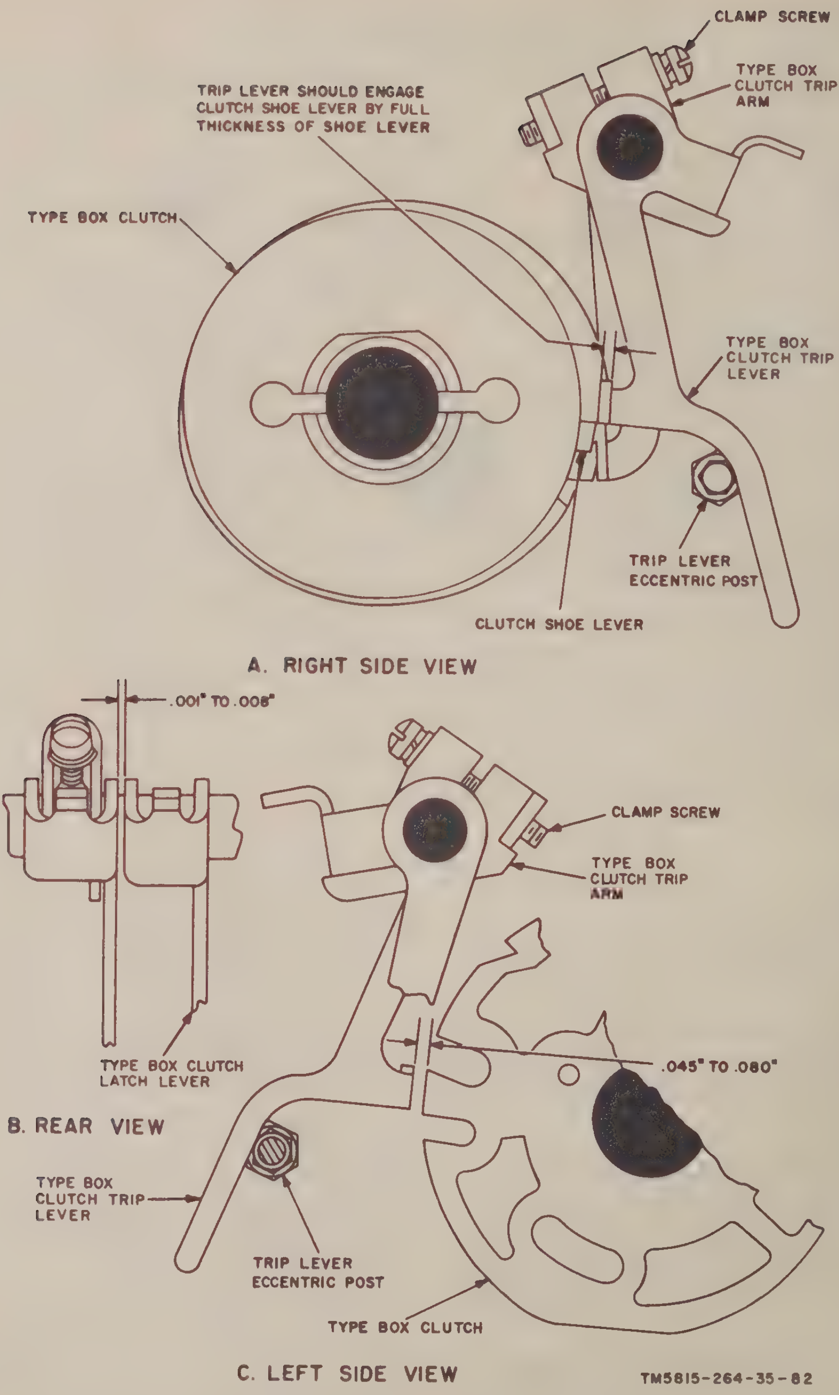

CLAMP SCREW
TYPE BOX CLUTCH TRIP ARM
TRIP LEVER SHOULD ENGAGE CLUTCH SHOE LEVER BY FULL THICKNESS OF SHOE LEVER
TYPE BOX CLUTCH
TYPE BOX CLUTCH TRIP LEVER
TRIP LEVER ECCENTRIC POST
CLUTCH SHOE LEVER
A. RIGHT SIDE VIEW
.001" TO .008"
CLAMP SCREW
TYPE BOX CLUTCH TRIP ARM
TYPE BOX CLUTCH LATCH LEVER
.045" TO .080"
B. REAR VIEW
TYPE BOX CLUTCH TRIP LEVER
TRIP LEVER ECCENTRIC POST
TYPE BOX CLUTCH
C. LEFT SIDE VIEW
TM5815-264-35-82

Figure 228. Type box clutch mechanism.

.085-inch greater when the clutch is engaged than when the clutch is disengaged.

b. Method of Checking. Measure the gap with a round wire gage under the following conditions:

(1) Disengage the clutch to be checked.

(2) Measure and note the gap.

(3) Trip the clutch and rotate it until the clutch shoe lever is toward the bottom of the unit.

(4) Align the head of the clutch drum mounting screw with the stop lug.

(5) Manually compress the shoe lever against the stop lug and allow them to snap apart.

(6) Measure the gap with the clutch thus engaged, and compare it with the clearance noted in (2) above.

Note. On multiple stop clutches, check the clearance at the stop lug which is adjacent to the notch in the clutch adjusting disk.

c. Adjustment.

(1) Adjust the clutch shoe lever as follows:

(*a*) Loosen the two clamp screws on the clutch cam disk.

(*b*) Engage a wrench or screwdriver on the lug of the adjusting disk and rotate the disk to obtain the requirement.

(*c*) Tighten the two clamp screws.

(2) Check the clutch drum for drag as follows:

(*a*) Disengage the clutch.

(*b*) Remove the drum mounting screw and lockwasher.

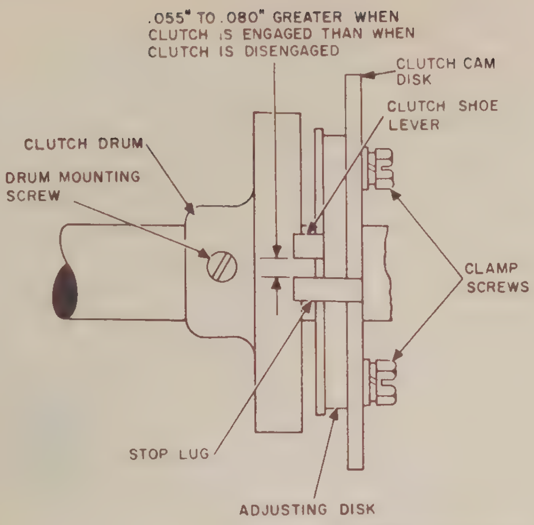
(*c*) Rotate the drum in its normal direction of rotation and make certain that it does not drag on the shoe.

(*d*) Replace the drum mounting screw and lockwasher.

(*e*) If the drum drags, repeat *c*(1)(*a*) through (*c*) above and refine the adjustment towards the maximum clearance.

272. Clutch Drum Adjustment

Note. This adjustment is applicable to the code bar, function, spacing, line feed, and type box clutch drums. It does not apply to the selector clutch drum.



TM5815-264-35-83

Figure 229. Clutch shoe mechanism (all clutches).

a. Requirement. When the clutch shoe lever is held disengaged, each clutch shoe should have .001- to .020-inch end play.

b. Method of Checking. Check the clearance given in the requirement with a flat or round wire gage.

c. Adjustment. Loosen the drum mounting screw (fig. 229) on each clutch drum; also loosen the mounting screw on the spacing clutch set collar (next to the spacing shaft driving gear). Position each drum to obtain the requirement; tighten each drum mounting screw, and the mounting screw on the spacing clutch set collar.

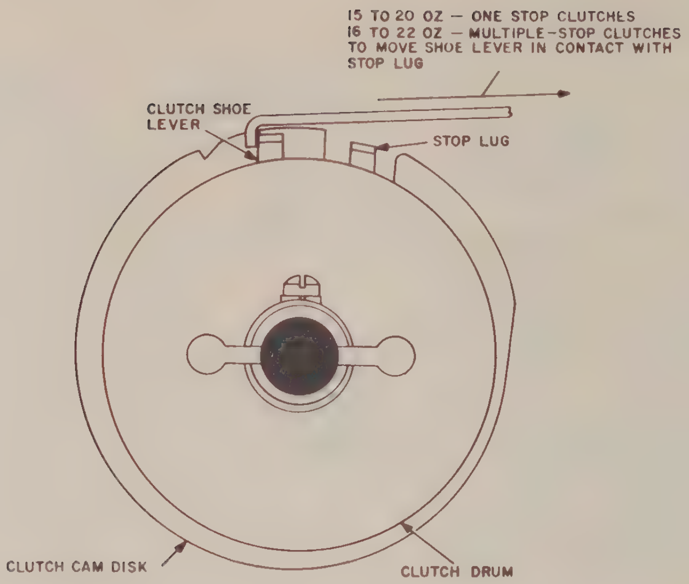
273. Clutch Shoe Lever Spring Tension (A, fig. 230)

Note. This adjustment is applicable to the selector, code bar, function, spacing, line feed, and type box clutch shoe lever springs.

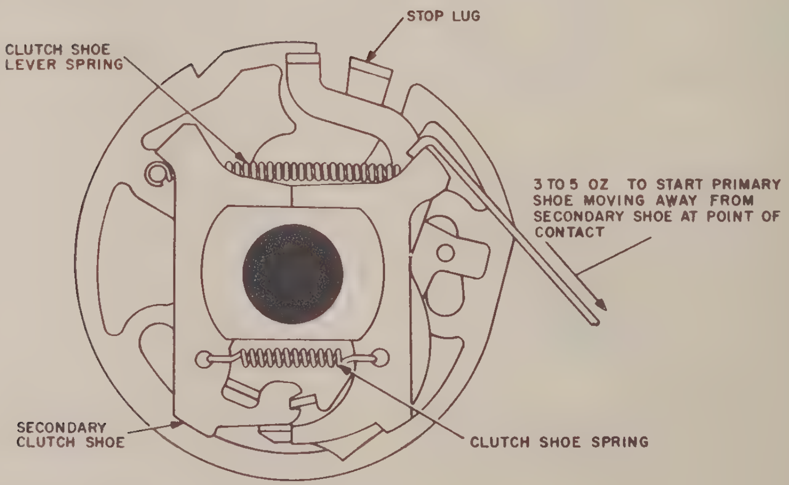
a. Requirements. When the clutch is engaged and the cam disk is held to prevent turning, the following requirements should be met:

(1) *One-stop clutches.* It should require 15 to 20 ounces to move the shoe lever in contact with the stop lug.

(2) *Multi-stop clutches.* It should require 16 to 22 ounces to move the shoe lever in contact with the stop lug.


15 TO 20 OZ — ONE STOP CLUTCHES
16 TO 22 OZ — MULTIPLE-STOP CLUTCHES
TO MOVE SHOE LEVER IN CONTACT WITH
STOP LUG
CLUTCH SHOE
LEVER
STOP LUG
CLUTCH CAM DISK
CLUTCH DRUM

A. RIGHT SIDE VIEW


STOP LUG
CLUTCH SHOE
LEVER SPRING
3 TO 5 OZ TO START PRIMARY
SHOE MOVING AWAY FROM
SECONDARY SHOE AT POINT OF
CONTACT
SECONDARY
CLUTCH SHOE
CLUTCH SHOE SPRING

B. RIGHT SIDE VIEW

TM5815-264-35-84

Figure 230. Clutch mechanism.

b. Method of Checking. Apply the hook end of a 32-ounce scale to the clutch shoe lever and pull tangent to the clutch to obtain the requirement.

c. Adjustment. Replace any clutch shoe lever spring that fails to meet the requirement described in either *a*(1) or (2) above.

274. Clutch Shoe Spring Tension
(B, fig. 230)

Note. This adjustment is applicable to the selector, code bar, function, spacing, line feed and type box clutch shoe springs. In order to check the spring tension, it is necessary to remove the clutch from the main shaft. Therefore, it should not be checked unless there is good reason to believe that it does not meet the requirement.

a. Requirement. When the clutch drum is removed, it should require 3 to 5 ounces to start the primary shoe moving away from the secondary shoe at point of contact.

b. Method of Checking. Remove the main shaft as described in paragraph 104 *a.* Remove the clutch to be checked, as described in paragraph 104*b.* Apply the hook end of a 8-ounce scale to the primary shoe and pull at a tangent to the friction surface to obtain the requirement.

c. Adjustment. Replace any clutch shoe spring that fails to meet the requirement. Replace the clutch as described in paragraph 104*c.* Reinstall the main shaft as described in paragraph 104*d.*

275. Spacing Gear Phasing Adjustment
(fig. 231)

a. Requirement. When the spacing clutch is disengaged, the index line (A) on the spacing pawl should be between the two lines on the pawl retaining washer.

b. Adjustment. Remove the mounting screw (B) from the spacing shaft gear. Hold the pawls in alignment and engage the spacing shaft gear with the clutch gear at a point where the spacing shaft gear mounting screw hole is in line with the tapped hole in the spacing shaft. Insert and tighten the mounting screw. Check the related adjustments described in paragraphs 310, 312, and 359.

276. Spacing Gear Clearance Adjustment
(fig. 231)

a. Requirement. When the type box carriage is fully returned, there should be a minimum backlash without binding between the spacing shaft gear, and the spacing shaft drive gear on the main shaft.

b. Adjustment. Insert shims between the spacing shaft bearing and front plate at the upper mounting screw to increase the clearance. To decrease the clearance, insert shims between the spacing shaft gear and front plate at the lower mounting screw.

277. Line Feed Clutch Phasing Adjustment
(fig. 232)

a. Requirement. When the line feed clutch is disengaged, both line-feed bars (A) should engage the teeth of the line feed spur gear.

b. Adjustment. With the line feed clutch disengaged, loosen the assembly bearing post (B) and mesh the line feed eccentric spur gear the clutch gear so that both line feed bars are engaged with the line with feed clutch spur gear. Check the related adjustment described in paragraph 341.

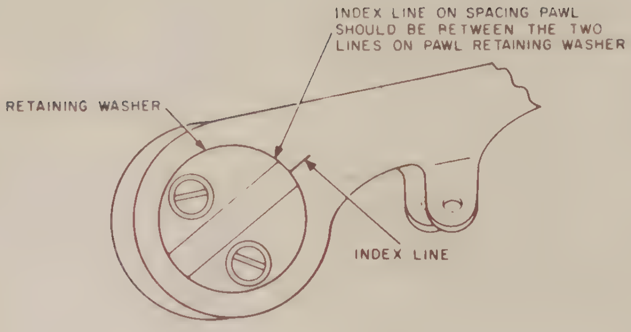
278 Main Rocker Shaft Left Bracket Adjustment
(B, fig. 232)

a. Requirement. The main rocker shaft left bracket should be firmly seated against the inner bearing race.

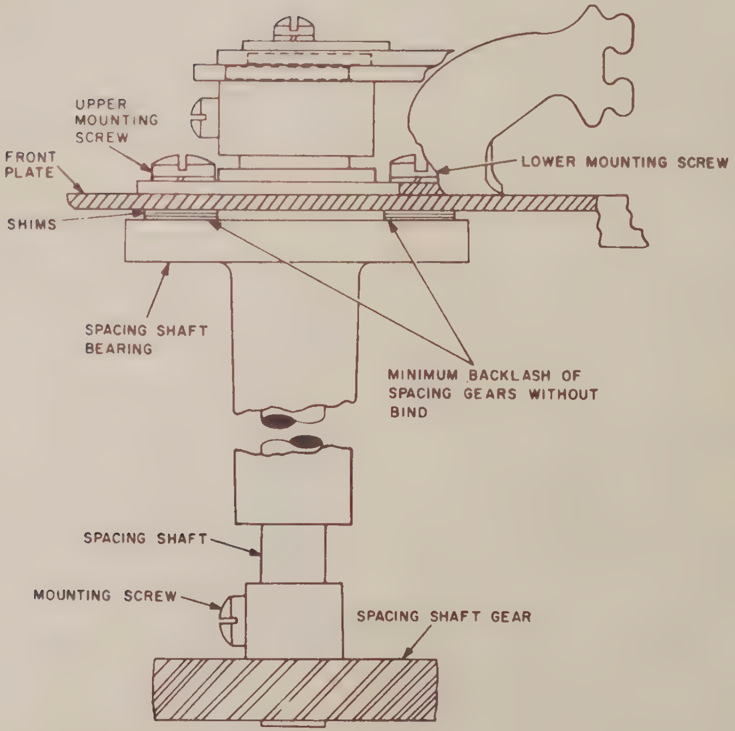
b. Adjustment. Loosen the two mounting screws on the main rocker shaft left bracket. Hold the main rocker shaft in the extreme left position and position the bracket against the inner bearing race; tighten the two mounting screws. Check the related adjustments described in paragraphs 279, 282, 284, 264, 294, 297, 299, 321, 327, 333, and 345.

279. Main Rocker Shaft Eccentric Stud Adjustment
(fig. 233)

a. Requirement. When the type box clutch is disengaged, there should be a .055- to .090-inch gap between the lower side of the lock lever roller (A), and the top edge of the shoulder on the horizontal positioning lock lever.


INDEX LINE ON SPACING PAWL SHOULD BE BETWEEN THE TWO LINES ON PAWL RETAINING WASHER
RETAINING WASHER
INDEX LINE

A. FRONT VIEW


UPPER MOUNTING SCREW
FRONT PLATE
LOWER MOUNTING SCREW
SHIMS
SPACING SHAFT BEARING
MINIMUM BACKLASH OF SPACING GEARS WITHOUT BIND
SPACING SHAFT
MOUNTING SCREW
SPACING SHAFT GEAR

B. BOTTOM VIEW

TM5815-264-35-85

Figure 231. Spacing mechanism.

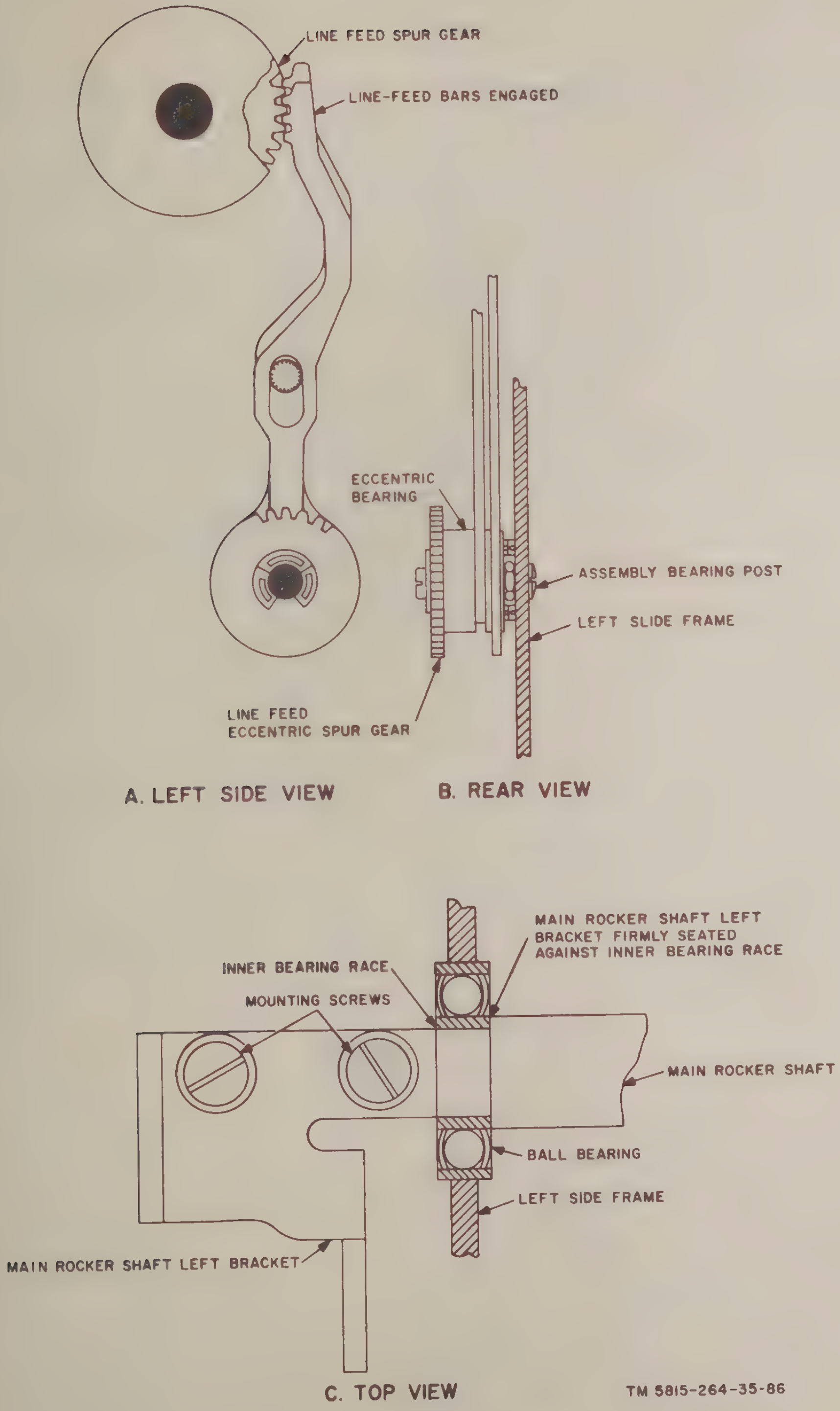
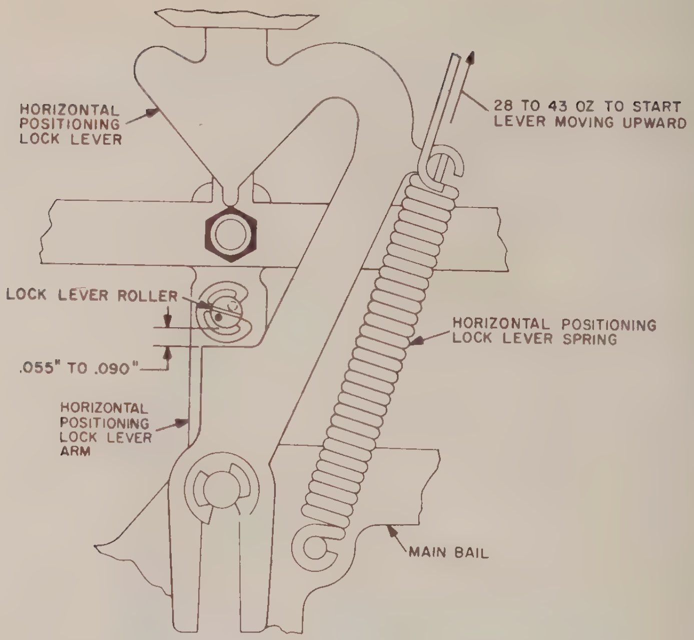
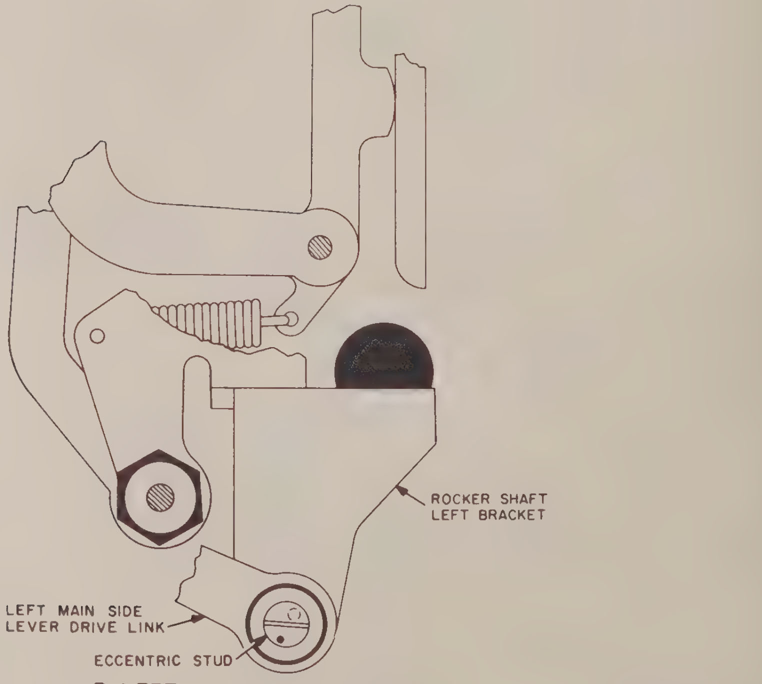

LINE FEED SPUR GEAR
LINE-FEED BARS ENGAGED
ECCENTRIC BEARING
ASSEMBLY BEARING POST
LEFT SLIDE FRAME
LINE FEED ECCENTRIC SPUR GEAR
A. LEFT SIDE VIEW
B. REAR VIEW
INNER BEARING RACE
MOUNTING SCREWS
MAIN ROCKER SHAFT LEFT BRACKET FIRMLY SEATED AGAINST INNER BEARING RACE
MAIN ROCKER SHAFT
BALL BEARING
LEFT SIDE FRAME
MAIN ROCKER SHAFT LEFT BRACKET
C. TOP VIEW
TM 5815-264-35-86

Figure 232. Line feed main and rocker shaft mechanisms.


HORIZONTAL POSITIONING LOCK LEVER
28 TO 43 OZ TO START LEVER MOVING UPWARD
LOCK LEVER ROLLER
.055" TO .090"
HORIZONTAL POSITIONING LOCK LEVER SPRING
HORIZONTAL POSITIONING LOCK LEVER ARM
MAIN BAIL

A. FRONT VIEW


ROCKER SHAFT LEFT BRACKET
LEFT MAIN SIDE LEVER DRIVE LINK
ECCENTRIC STUD
TM5815-264-35-87

B. LEFT SIDE VIEW

Figure 233. Shift and positioning mechanisms.

b. Method of Checking. Take up the play in the horizontal positioning lock lever arm towards the front. Check the clearance with a round wire gage.

c. Adjustment. Loosen the mounting nut on the eccentric stud (B), in the lower end of the main rocker shaft. Position the eccentric stud to obtain the requirement, tighten the left bracket mounting nut. Keep the high part of the eccentric stud (marked with a dot) below the center line of the left main side lever drive link. Check the related adjustments described in paragraphs 282, 284, 264, 294, 297, 299, 321, 327, 333, and 345.

280. Horizontal Positioning Lock Lever Spring Tension

(A, fig. 233)

a. Requirement. When the horizontal positioning lock lever is in its upper position, it should require 28 to 43 ounces to start the lock lever moving.

b. Method of Checking. Apply the hook end of a 64-ounce scale on the horizontal positioning lock lever spring extension and pull in line with the spring.

c. Adjustment. Replace the horizontal positioning lock lever spring if it fails to meet the requirement.

281. Breaker Slide Bail Spring Tension

(fig. 234)

Note. The requirement described below applies to both the left and right breaker slide bail springs. Only the left breaker slide bail is shown in the illustration.

a. Requirement. When the main bail is in its lower position, it should require ½ to 1¾ ounces to start the breaker slide bail moving.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the lower extension of the breaker slide bail to measure the requirement.

c. Adjustment. Replace the left or right breaker slide bail spring if it fails to meet the requirement.

282. Right Vertical Positioning Lever Eccentric Stud Adjustment

(fig. 235)

a. Requirement. There should be a .030- to .050-inch clearance between the toe of the right upper link extension and the bottom of the common code bar.

b. Method of Checking. Disengage the type box clutch. Place the common code bar in the spacing position. Take up the play by pressing downward on the common code bar at the code bar guide block, to make the clearance a minimum, then measure the gap with a round wire gage.

c. Adjustment. Loosen the retaining nut on the eccentric stud. Position the eccentric stud in the main rocker shaft bracket. Position the high part of the eccentric (marked with a dot) toward the rear; tighten the retaining nut. Check the related adjustments described in paragraphs 284, 299, 333, and 345.

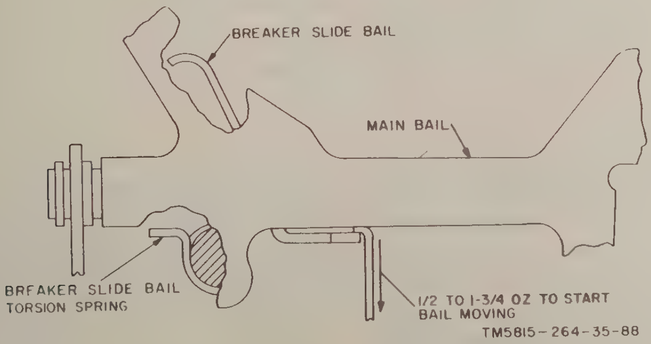

BREAKER SLIDE BAIL
MAIN BAIL
BREAKER SLIDE BAIL TORSION SPRING
1/2 TO 1-3/4 OZ TO START BAIL MOVING
TM5815-264-35-88

Figure 234. Breaker slide bail spring tension, front view.

283. Vertical Positioning Lever Spring Tension (fig. 235).

Note. The requirement described below applies to both the right and left vertical positioning lever springs. Only the right vertical positioning lever spring is shown on the illustration.

a. Requirement. When the toes of the upper link extensions (right and left) are in contact with the suppression code bar and the upper and lower link extensions are not buckled, it should require 4 to 12 ounces to move the lower link extension away from the slide extension.

b. Method of Checking. Apply the hook end of a 32-ounce scale on the lower link extension just above the forward projection and pull toward the rear.

c. Adjustment. Replace the right or left vertical positioning lever spring if it fails to meet the requirement.

284. Left Vertical Positioning Lever Eccentric Stud Adjustment (fig. 236)

a. Requirement. When the common code bar is in its spacing position, the upper and lower link extensions of the right and left vertical positioning levers should buckle equally within .006 inch.

b. Method of Checking. Trip the type box clutch and rotate the main shaft until the toe of the upper link extension on the right vertical positioning lever touches the common code bar, and buckles the lower link extension .001- to .008-inch. The toe of the upper link extension on the left vertical positioning lever should touch the common code bar, and buckle the lower link extension equally within .006 inch.

c. Adjustment. Loosen the retaining nut on the eccentric stud. Position the eccentric stud on the main rocker shaft left bracket inner arm. Position the high part of the cam (marked with a dot) toward the rear; tighten the retaining nut. Check the related adjustments described in paragraphs 299, 333, and 345.

285. Vertical Positioning Lock Lever Spring Tension (fig. 236)

Note. The requirement described below applies to both the left and right vertical positioning lock lever springs. Only the left vertical positioning lock lever spring is shown on the illustration.

a. Requirement. When the type box clutch is in its stop position, it should require 2 to 4 ounces to start the left vertical positioning lock lever moving.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the upper end of the left vertical positioning lock lever and pull toward the rear.

c. Adjustment. Replace the left or right vertical positioning lock lever spring if it fails to meet the requirement.

286. Oscillating Rail Slide Position Adjustment (A, fig. 237)

a. Requirement. When the feed pawl, which is farthest advanced is engaging the tooth immediately above the cut-away section of the ratchet wheel there should be a .025- to .050-inch clearance between the right end of the oscillating rail slide and the edge of the pulley.

b. Method of Checking. Loosen five mounting screws on the spacing drum to permit rotation of the carriage return ring and the automatic carriage return-line feed ring. Disengage the spacing clutch. Measure the requirement described in *a* above with a round wire gage. Tighten the five mounting screws.

c. Adjustment. Loosen the two clamp screws on the oscillating rail slide. Position the side to obtain the requirement; tighten the clamp screws. Check the related adjustments described in paragraphs 317, 319, 310, 312, and 359.

287. Spacing Feed Pawl Spring Tension (fig. 237)

a. Requirement. When the spacing shaft is rotated until one of the spacing pawls is in its least advanced position, and resting against the ratchet wheel, it should require 2½ to 4 ounces to pull each spacing pawl spring to its installed length .

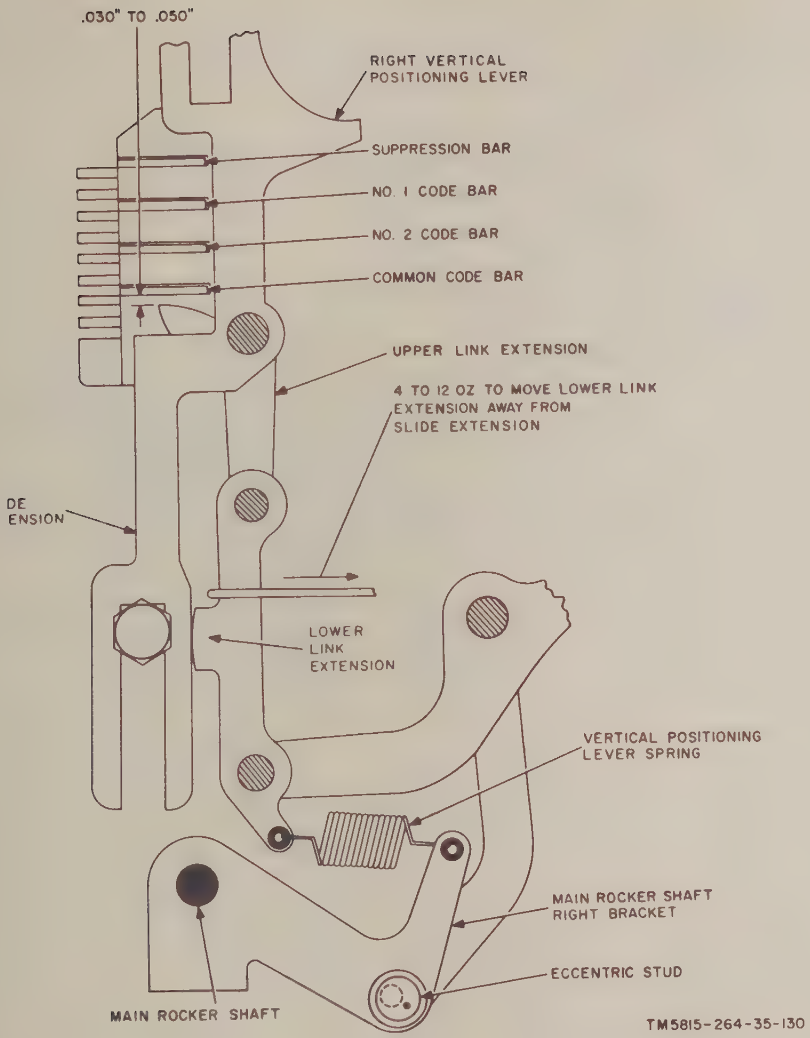

.030" TO .050"
RIGHT VERTICAL POSITIONING LEVER
SUPPRESSION BAR
NO. 1 CODE BAR
NO. 2 CODE BAR
COMMON CODE BAR
UPPER LINK EXTENSION
4 TO 12 OZ TO MOVE LOWER LINK EXTENSION AWAY FROM SLIDE EXTENSION
DE ENSION
LOWER LINK EXTENSION
VERTICAL POSITIONING LEVER SPRING
MAIN ROCKER SHAFT RIGHT BRACKET
ECCENTRIC STUD
MAIN ROCKER SHAFT
TM5815-264-35-130

Figure 235. Right vertical positioning mechanism, right side view.

b. Method of Checking.

(1) With the spacing pawl spring unhooked, apply the pull end of an 8-ounce scale to the spring loop.

(2) Check the other spacing pawl spring in the same manner as described in (1) above.

c. Adjustment. Replace either spacing pawl spring if it fails to meet the requirement.

288. Spacing Trip Lever Bail Adjustment (fig. 238)

a. Requirement. When the spacing clutch trip lever arm in its upward position, and the type box clutch rotated through approximately one-half its cycle, and with the function pawls disengaged from their function bars, there should be .010- to .040-inch clearance between the top surface of the spacing clutch trip lever

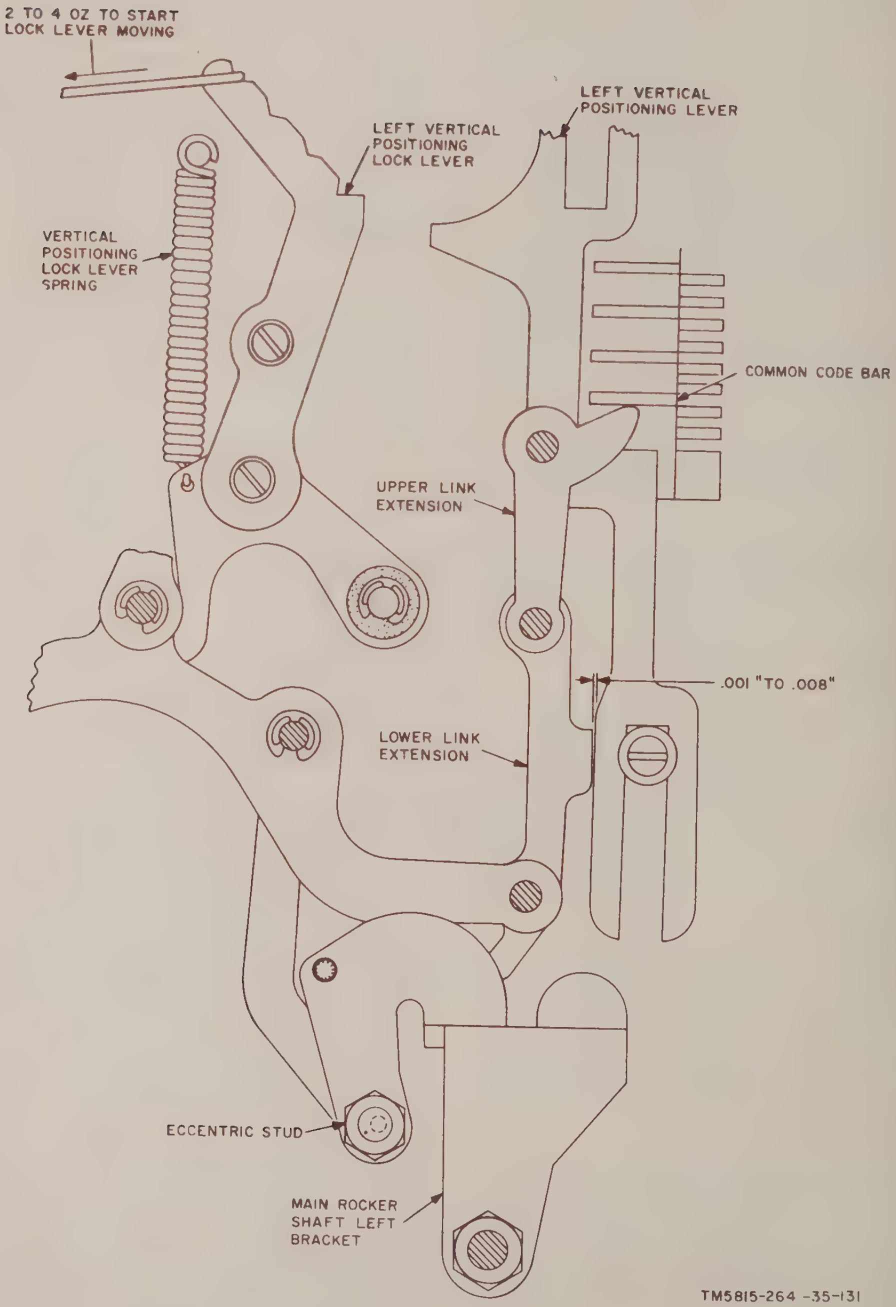

2 TO 4 OZ TO START LOCK LEVER MOVING
LEFT VERTICAL POSITIONING LEVER
LEFT VERTICAL POSITIONING LOCK LEVER
VERTICAL POSITIONING LOCK LEVER SPRING
COMMON CODE BAR
UPPER LINK EXTENSION
.001 "TO .008"
LOWER LINK EXTENSION
ECCENTRIC STUD
MAIN ROCKER SHAFT LEFT BRACKET
TM5815-264-35-131

Figure 236. Left vertical positioning mechanism, left side view.

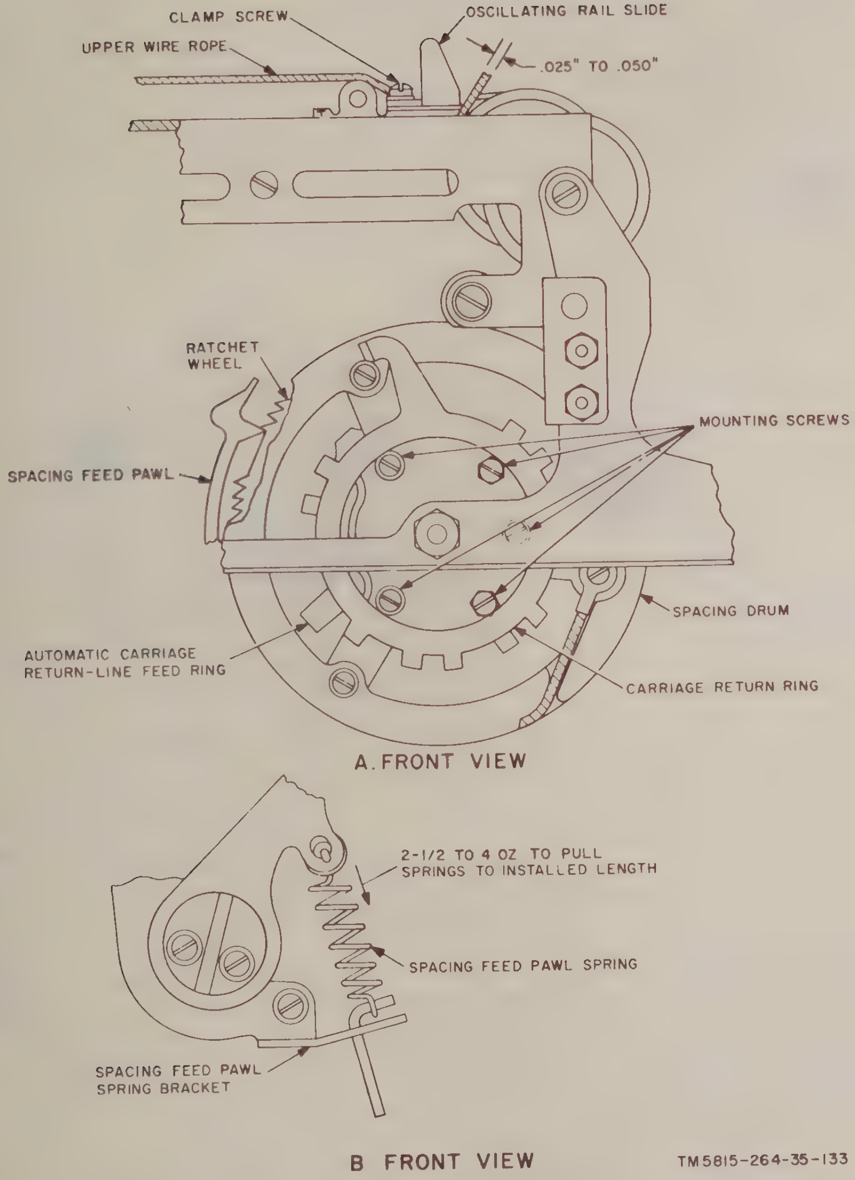

CLAMP SCREW
OSCILLATING RAIL SLIDE
UPPER WIRE ROPE
.025" TO .050"
RATCHET WHEEL
MOUNTING SCREWS
SPACING FEED PAWL
SPACING DRUM
AUTOMATIC CARRIAGE RETURN-LINE FEED RING
CARRIAGE RETURN RING
A. FRONT VIEW
2-1/2 TO 4 OZ TO PULL SPRINGS TO INSTALLED LENGTH
SPACING FEED PAWL SPRING
SPACING FEED PAWL SPRING BRACKET
B FRONT VIEW
TM5815-264-35-133

Figure 237. Spacing mechanism.

arm and the spacing clutch trip lever arm and the upper arm of the spacing trip lever.

b. Method of Checking. Check the requirement with a round wire gage.

c. Adjustment. Loosen the two mounting screws on the main rocker shaft cam plate. Position the cam plate on the main rocker shaft to obtain the requirement. The forward edge of the cam plate should be parallel to the square shaft; tighten the mounting screws.

289. Spacing Trip Lever Spring Tension
(fig. 238)

a. Requirement. When the type box clutch

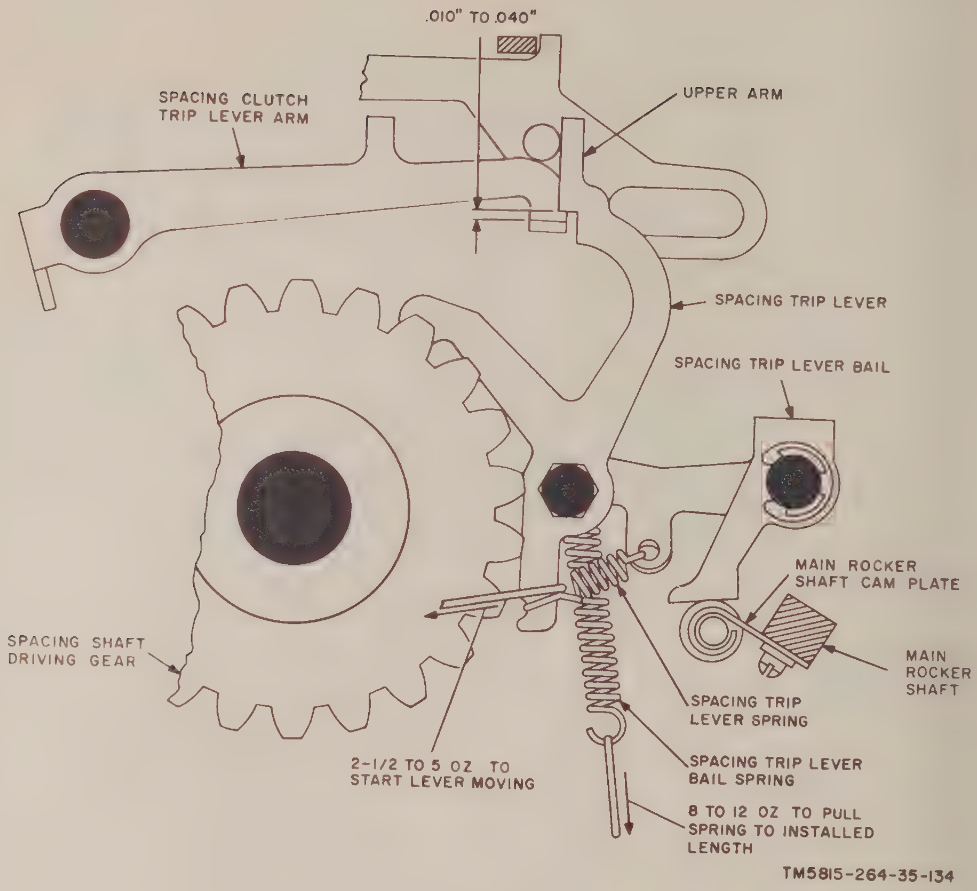

.010" TO .040"
SPACING CLUTCH TRIP LEVER ARM
UPPER ARM
SPACING TRIP LEVER
SPACING TRIP LEVER BAIL
MAIN ROCKER SHAFT CAM PLATE
MAIN ROCKER SHAFT
SPACING SHAFT DRIVING GEAR
SPACING TRIP LEVER SPRING
SPACING TRIP LEVER BAIL SPRING
2-1/2 TO 5 OZ TO START LEVER MOVING
8 TO 12 OZ TO PULL SPRING TO INSTALLED LENGTH
TM5815-264-35-134

Figure 238. Spacing mechanism, left side view.

is disengaged, it should require 2½ to 5 ounces to start the spacing trip lever moving.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the lower end of the spacing trip lever and pull toward the rear.

c. Adjustment. Replace the spacing trip lever spring if it fails to meet the requirement.

290. Spacing Trip Lever Bail Spring Tension
(fig. 238)

a. Requirement. When the spacing trip lever bail is against its stop, and with the spacing trip lever spring unhooked from the mounting bracket, it should require 8 to 12 ounces to pull the spring to its installed length.

b. Method of Checking. Hook a 32 ounce scale to the spring loop.

c. Adjustment. Replace the trip lever bail spring if it fails to meet the requirement.

291. Figures-Letters Shift Code Bar Operating Mechanism Adjustment
(fig. 239)

a. Requirement.

(1) With the function clutch rotated until the clutch cam disk stop lug is toward the bottom of the unit, hook the figures function pawl over the end of its associated function bar. There should be .001- to .020-inch clearance between the upper guide plate extension (A) and the figures shift slide, when play in the shift slide is taken up to make the clearance a maximum.

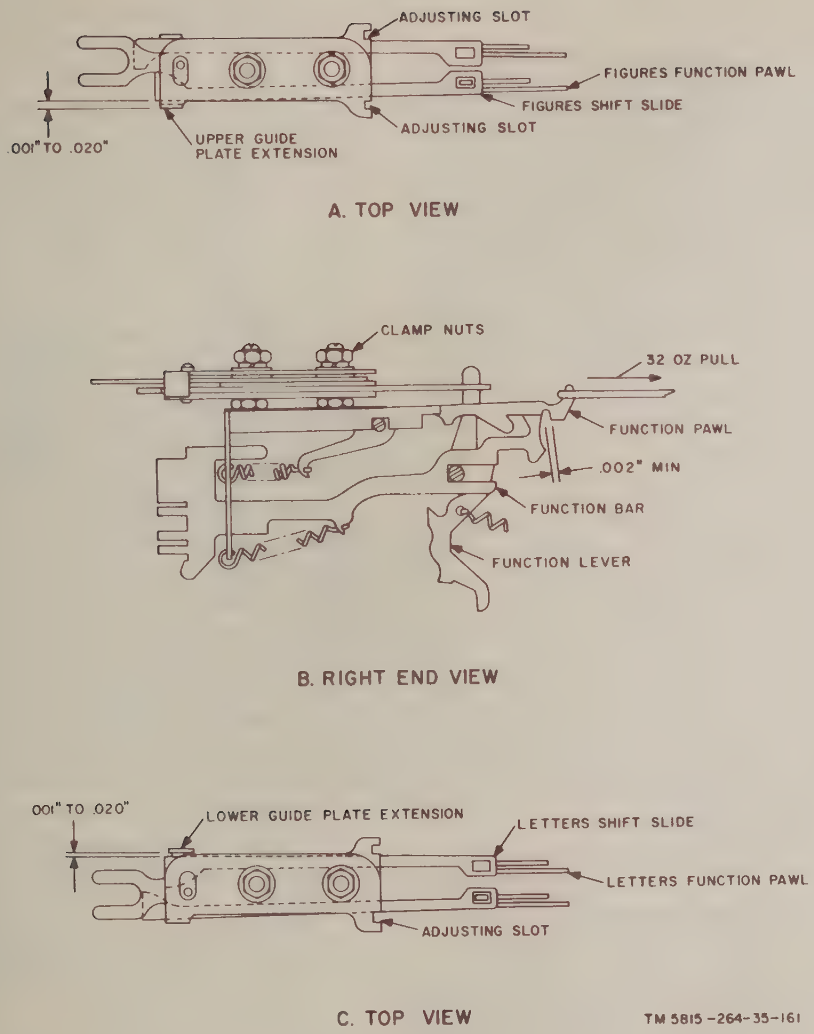

ADJUSTING SLOT
FIGURES FUNCTION PAWL
FIGURES SHIFT SLIDE
ADJUSTING SLOT
.001" TO .020"
UPPER GUIDE PLATE EXTENSION
A. TOP VIEW
CLAMP NUTS
32 OZ PULL
FUNCTION PAWL
.002" MIN
FUNCTION BAR
FUNCTION LEVER
B. RIGHT END VIEW
.001" TO .020"
LOWER GUIDE PLATE EXTENSION
LETTERS SHIFT SLIDE
LETTERS FUNCTION PAWL
ADJUSTING SLOT
C. TOP VIEW
TM 5815-264-35-161

Figure 239. Figures-letters shift code bar mechanism.

(2) There should be some clearance (not less than .002 inch) between the shoulder of the figures function pawl (B), and the face of its associated function bar when a force of 32 ounces is applied to the pawl in a rearward direction.

(3) Repeat the procedure described in (1) and (2) above, for the letters function pawl. Measure the maximum clearance between the lower guide plate extension (C) and the letter shift slide, and the minimum clearance between the shoulder of the letters function pawl (B) and the face of the function bar.

b. Adjustment. Loosen the two clamp nuts on the upper guide plate. Position the upper and/or lower guide plate by means of the adjusting slot to obtain the requirement described in *a*(1) and (2) above; tighten the clamp screws.

292. Function Reset Bail Blade Adjustment (fig. 240)

a. Requirements.

(1) With the function and type box clutches disengaged and the function pawls unlatched, there should be an .018- to .035-inch clearance between the function bar (A) and reset bail blade when the function bar is held in its maximum rearward position.

(2) With each function lever (B) held in its maximum rearward position, the associated function pawl should overtravel the function bar by some clearance not less than .002 inch when pulled with a tension of not more than 32 ounces.

b. Method of Checking.

(1) Measure the clearance specified in *a*(1) above at the function bars located in function box slots 1, 4, 11, 18, 23, 33, 38, and 41. When viewed from the rear, the slots are numbered from left to right. If there is no function bar in the designated slot, select the nearest function bar. If there is a bar on each side of a designated vacant slot, select the one with the higher number.

(2) If the carriage return lever adjustment (par. 306) has not been made, its clamp screw should be loosened before checking the requirement described in *a*(2) above. Position the function clutch so that the lug on the clutch cam disk is toward the bottom of the unit. Strip off any function pawls which may have been selected. Manually operate and hold the function lever in its maximum rearward position with a tension of not more than two pounds. Apply the hook end of a 64-ounce scale to the function pawl and hold the pawl in the rear position with a tension of 32 ounces. Do not latch more than one pawl at at a time as the load on the function bar reset bail affects overtravel. Measure the clearance, and check the requirement at each function pawl on the function box.

c. Adjustment.

(1) Loosen the mounting screws on the reset bail blade until they are friction tight. Position the blade to obtain the clearance specified in *a*(1) above; tighten the mounting screws.

(2) If necessary, refine the adjustment described in (1) above within the .018- to .035-inch limits, to obtain the clearance specified in *a*(2) above. Check the related adjustment described in paragraph 306.

293. Function Bar Reset Bail Spring Tension (C, fig. 240)

a. Requirement. It should require a pull of 10 to 22 ounces to start the function bar reset bail moving.

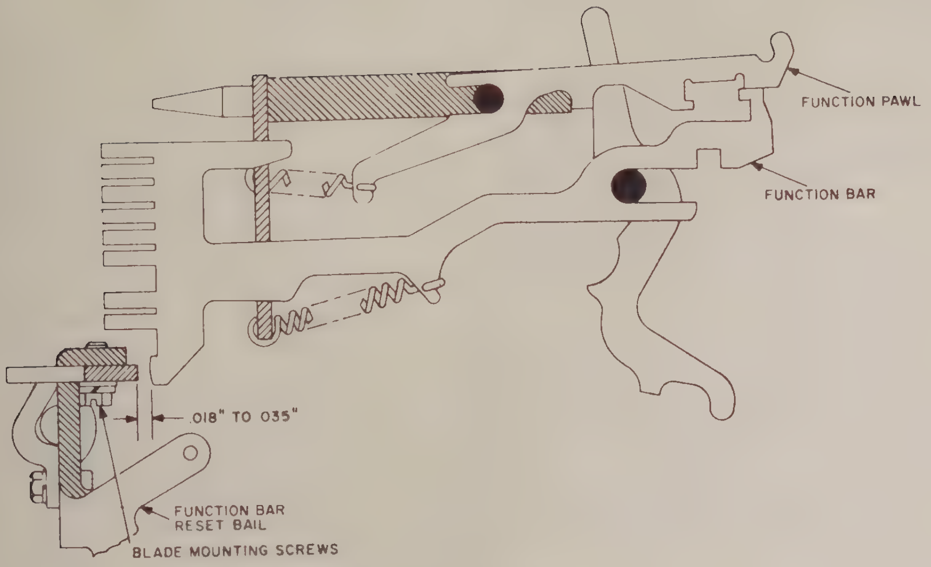
b. Method of Checking. Set the typing unit upside down. Hold the No. 1 code bar in its marking position so that no function bar is selected. Rotate the main shaft until the function bar reset bail springs are in their minimum length position. Place the hook end of a 32-ounce scale between the clutch trip shaft and the space suppression bail and hook the scale on the front edge of the function bar reset bail approximately at the middle of the bail. Pull toward the rear.

c. Adjustment. Replace the left and/or right reset bail spring if it fails to meet the requirement.

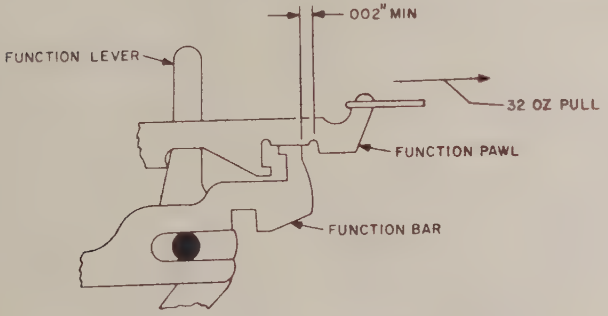
294. Horizontal Motion Reversing Slide Adjusting Stud Adjustment (A, fig. 241)

a. Requirement. With the type box clutch disengaged and the No. 3 code bar in the spacing position (right), the horizontal motion reversing slide detent rollers should be fully seated in the right-hand notches of the detent lever. When the No. 3 code bar is moved to the marking position (left) the reversing slide detent rollers should be fully seated in the left-hand notches of the detent lever.

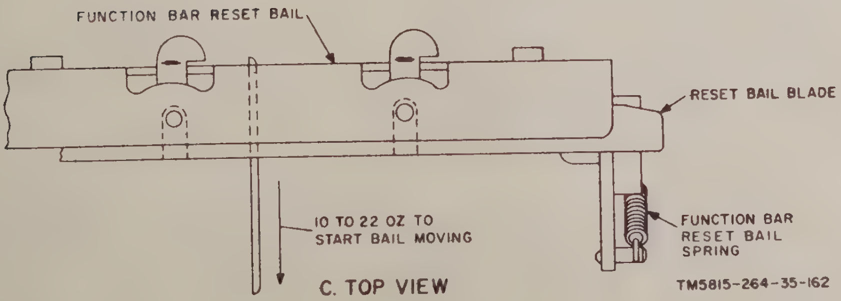
b. Method of Checking. To determine whether the detent rollers are fully seated in either the left or right hand notches, shift the No. 3 code bar to its spacing position. Move the horizontal motion reversing slide back and forth very slightly. If the bottom detent lever


FUNCTION PAWL
FUNCTION BAR
.018" TO .035"
FUNCTION BAR RESET BAIL
BLADE MOUNTING SCREWS

A. LEFT SIDE VIEW


.002" MIN
FUNCTION LEVER
32 OZ PULL
FUNCTION PAWL
FUNCTION BAR

B. LEFT SIDE PARTIAL VIEW


FUNCTION BAR RESET BAIL
RESET BAIL BLADE
10 TO 22 OZ TO START BAIL MOVING
FUNCTION BAR RESET BAIL SPRING
TM5815-264-35-162

C. TOP VIEW

Figure 240. Function reset bail mechanism.

follows the slide for any perceptible distance in a horizontal direction without moving up or down, the adjustment is within the specified requirement.

c. Adjustment. Loosen the mounting nut on the adjusting stud. Position the stud in its elongated hole to obtain the requirement; tighten the mounting nut. Check the related adjustment described in paragraph 297.

295. Horizontal Motion Reversing Slide Detent Spring Tension
(A, fig. 241)

a. Requirement. When the horizontal motion reversing slide is in its left-hand position, it should require 2 to 4½ ounces to start the reversing slide detent levers moving.

b. Method of Checking. Hook an 8-ounce scale in the upper right hand detent-lever notch and pull upward.

c. Adjustment. Replace the detent spring if it fails to meet the requirement.

296. Reversing Slide Brackets Adjustments
(B, fig. 241)

a. Requirement. When the horizontal motion reversing slide is moved toward the right and left through its full travel, the right motion should buckle the left shift drive link assembly and the left motion should buckle the right drive link assembly. The amount of buckling in each case should be within .030- to .045-inch.

b. Method of Checking. Disengage the type box clutch, code bar clutch and function clutch. Move the horizontal motion reversing slide to its extreme left position. Measure the amount of buckle, at the point of maximum clearance, between the lower edge of the inner link and the upper surface of the outer link extension of the right shift drive link assembly. Move the reversing slide to its extreme right position and measure the buckle of the left shift drive link assembly as given in the above procedure.

c. Adjustment. Loosen the clamp screw on the left and right reversing slide bracket. Position each bracket to obtain the requirement; tighten the clamp screws. Check the related adjustment described in paragraph 297.

297. Horizontal Positioning Shift Drive Link Assembly Adjustment
(fig. 242)

a. Requirements.

(1) There should be a .015- to .040-inch clearance between each side of the center (common) horizontal stop slide and the decelerating slides.

(2) The clearance at the two sides (as specified in (1) above) should be equal within .008 inch.

(3) The left and right shift drive link assembly should return freely to their normal straightened position (unbuckled) when manually buckled.

(4) The horizontal positioning mechanism must be free of binds. The mechanism is considered to be free, if the type box clutch disk has some movement in the normal direction of rotation when in the stop position.

b. Method of Checking. Check the requirements described as follows:

(1) Rotate the main shaft so that the code bar, function, and type box clutches are in the stop position.

(2) Return the type box carriage.

(3) Place the No. 4 and 5 code bars in the spacing position.

(4) Move the horizontal motion reversing slide to the right. The right shift drive link assembly should be in the straight (unbuckled) position.

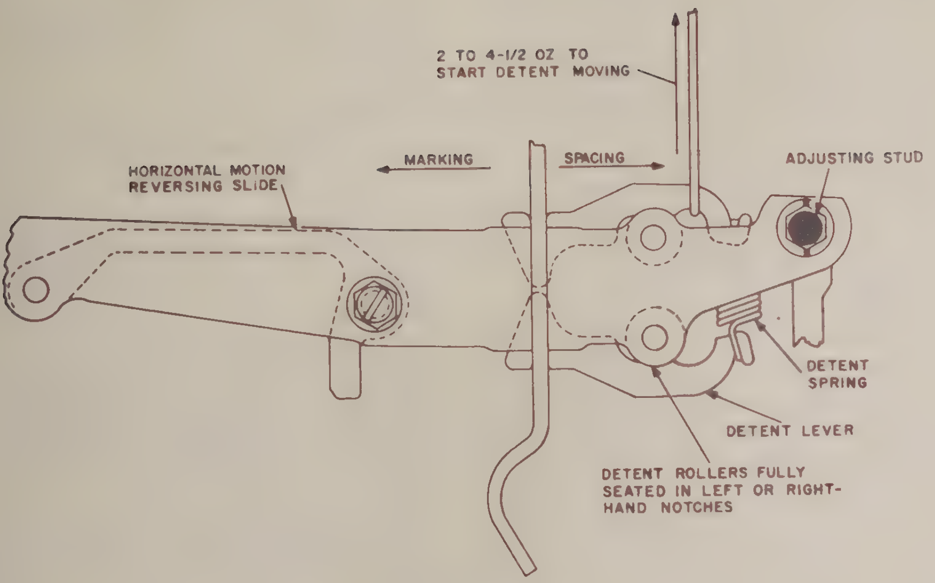
(5) Manually buckle the right shift drive link assembly and observe if it freely returns to its normal straightened position.

(6) Measure the clearance specified in *a*(1) above at the right decelerating slide, and record.

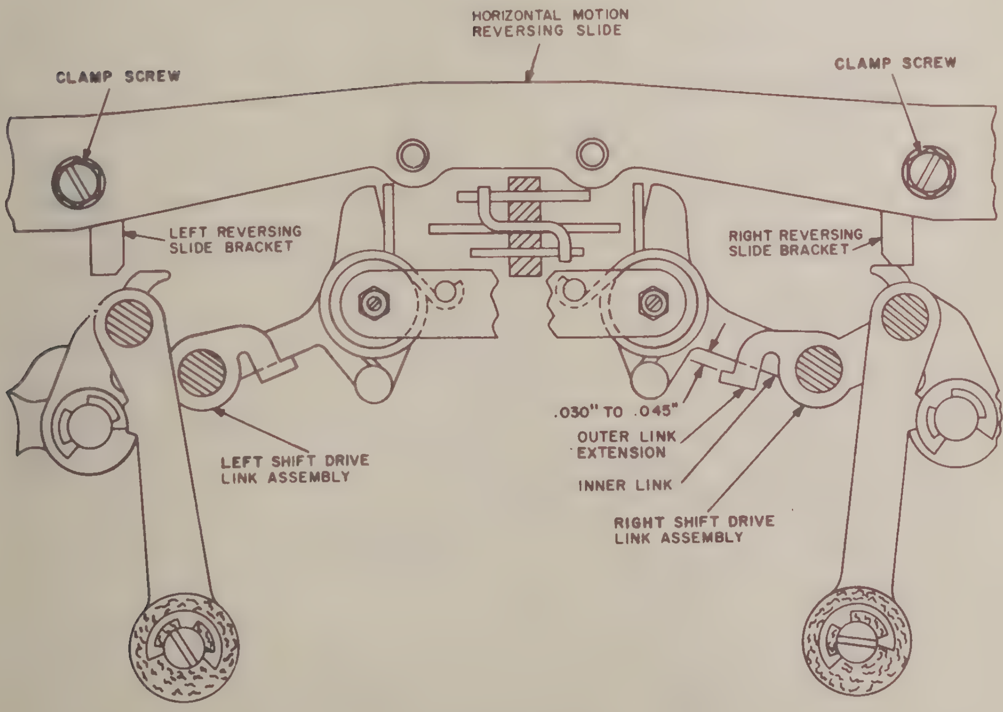
(7) Move the horizontal motion reversing slide to the left. The left shift drive link assembly should be in the straight (unbuckled) position.

(8) Manually buckle the left shift drive link assembly and observe if it returns freely to its normal straightened position.

(9) Measure the clearance specified in *a*(1) above at the left decelerating slide, and record.


2 TO 4-1/2 OZ TO
START DETENT MOVING
MARKING
SPACING
ADJUSTING STUD
HORIZONTAL MOTION
REVERSING SLIDE
DETENT
SPRING
DETENT LEVER
DETENT ROLLERS FULLY
SEATED IN LEFT OR RIGHT-
HAND NOTCHES

A. FRONT VIEW


HORIZONTAL MOTION
REVERSING SLIDE
CLAMP SCREW
CLAMP SCREW
LEFT REVERSING
SLIDE BRACKET
RIGHT REVERSING
SLIDE BRACKET
.030" TO .045"
OUTER LINK
EXTENSION
INNER LINK
LEFT SHIFT DRIVE
LINK ASSEMBLY
RIGHT SHIFT DRIVE
LINK ASSEMBLY

B. FRONT VIEW

TM5815-264-35-163

Figure 241. Horizontal motion reversing mechanism.

(10) The difference in the measurements recorded in (6) and (8) above should be within the limit specified in *a*(2) above.

(11) Move or rotate the type box clutch disk in the normal direction of rotation to check the requirement described in *a*(4) above.

c. Adjustment. Loosen the bearing stud mounting screws and the connecting strip mounting screws friction tight. Position one or both bearing studs on the connecting strip to provide a .025- to .035-inch clearance between the center (common) horizontal slide and the decelerating slide, on the side where the shift drive link assembly linkage is not buckled. Tighten the connecting strip mounting screws only. Change the position of the horizontal motion reversing slide and check the opposite clearance. Equalize the clearance within .008 inch by shifting both bearing studs and connecting strip as a unit. Hold the drive link hub against the lower vertical link of the shift drive link assembly. Tighten the two outer bearing stud mounting screws. Check the related adjustments described in paragraphs 279, 282, 284, 288, 294, 299, 321, 327, 333, and 345.

298. Horizontal Positioning Shift Drive Link Assembly Spring Tension

(fig. 242)

a. Requirement. When a shift drive link assembly is in the straight or unbuckled position, it should require 6 to 12 ounces to start the link assembly buckling.

b. Method of Checking. With a link in the straight or unbuckled position, apply the push end of a 32-ounce scale to the upper link extension of the assembly and push downward. Measure the tension at both left and right upper link extensions.

c. Adjustment. Replace the left and/or right torsion spring if it fails to meet the requirement.

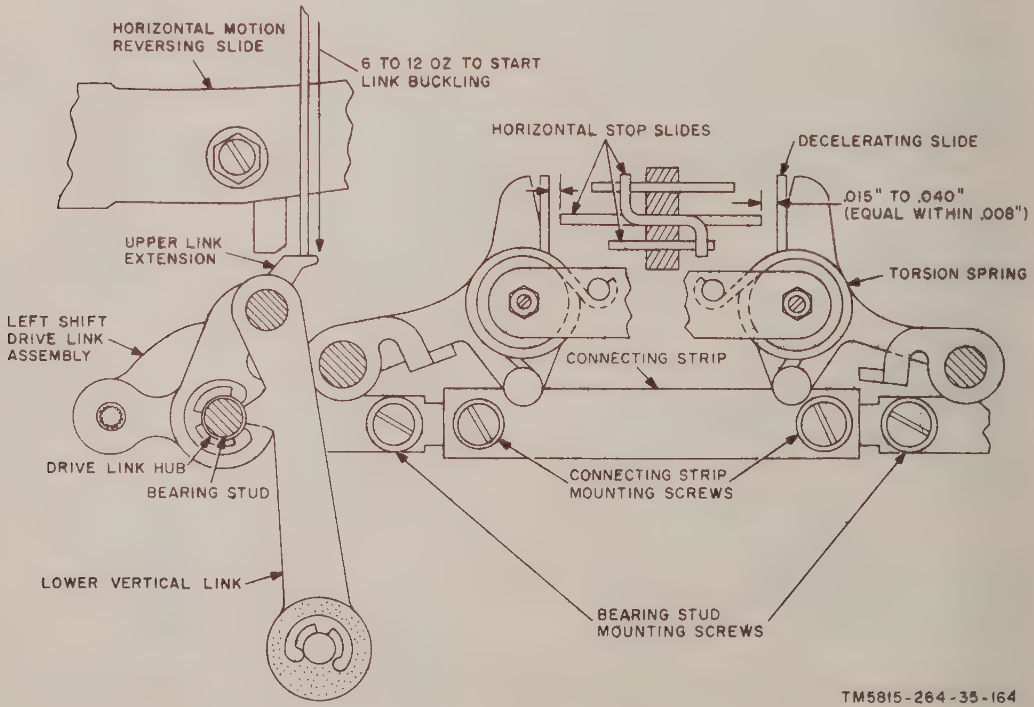

HORIZONTAL MOTION REVERSING SLIDE
6 TO 12 OZ TO START LINK BUCKLING
HORIZONTAL STOP SLIDES
DECELERATING SLIDE
.015" TO .040" (EQUAL WITHIN .008")
UPPER LINK EXTENSION
TORSION SPRING
LEFT SHIFT DRIVE LINK ASSEMBLY
CONNECTING STRIP
DRIVE LINK HUB
BEARING STUD
CONNECTING STRIP MOUNTING SCREWS
LOWER VERTICAL LINK
BEARING STUD MOUNTING SCREWS
TM5815-264-35-164

Figure 242. Horizontal positioning drive mechanism, front view.

299. Vertical Positioning Lock Lever Adjustment (fig. 243)

a. Requirements.

(1) The surface of the left and right main side lever follower arm rear extension and the left and right main side lever inner extension should be in contact or separated by not more than .004-inch, when play is taken up to make the clearance a minimum.

(2) The vertical surface in the notch of the left and right vertical positioning lock lever should be in contact with or within, .012 inch of the rear surface of the vertical slide projection, when play is taken up to make the clearance a maximum.

b. Method of Checking.

(1) Set up the letters combination and rotate the main shaft until the left and right main side lever are at the upper end of their travel, and the left and right vertical positioning lock levers are fully engaged with the vertical slide projection.

(2) Hook a 32-ounce scale under the type box carriage track, between the two mounting screws on the left-hand side. Apply 8 ounces of tension in an upward direction to take up the play in the left vertical positioning mechanism.

(3) Measure the clearances specified in *a*(1) and (2) above with a flat feeler gage.

(4) Hook a 32-ounce scale under the type box carriage track, between the mounting screws on the right-hand side. Apply 8 ounces of tension in an upward direction to take up the play in the right vertical positioning mechanism.

(5) Repeat (3) above.

c. Adjustments. Loosen the clamp screws on the left and right vertical positioning lock levers. Position the lock levers to obtain the requirements described in *a*(1) and (2) above; tighten the clamp screws.

300. Lower Wire Rope Adjustment (fig. 244)

a. Requirements.

(1) There should be at least .006 inch clearance between the lower wire rope and the carriage return latch bail post.

(2) When the left shift horizontal positioning drive link assembly is in its lowest position, there should be at least .030 inch clearance between the lower wire rope and the left lower vertical link of the left shift drive link assembly.

b. Method of Checking.

(1) Measure the clearance specified in *a*(1) above with a flat feeler gage.

(2) Rotate the main shaft until the left shift drive link assembly is in its lowest position; measure the clearance specified in *a*(2) above with a round wire gage.

c. Adjustment.

(1) Return the printing carriage to its left hand position.

(2) Loosen the rope clamp screw, on the spring drum, one turn only.

(3) Loosen the pulley bearing stud mounting screws.

(4) Position the pulley bearing studs to obtain the requirements described in *a*(1) and (2) above. Make certain that the wire rope has moved around its clamp screw to an equalized position; tighten the clamp screw and mounting screws. Check the related adjustments described in paragraphs 286, 317, 310, 312, and 359.

301. Tension Pulley Bail Spring Tension (fig. 244)

a. Requirement. It should require 18 to 22 ounces to pull the tension pulley bail spring to its position length.

b. Method of Checking. Unhook the spring from the tension pulley bail. Move the bail downward until its extension is resting on the opening in the front plate. Hook a 32-ounce scale in the spring loop and pull to position length; replace the spring.

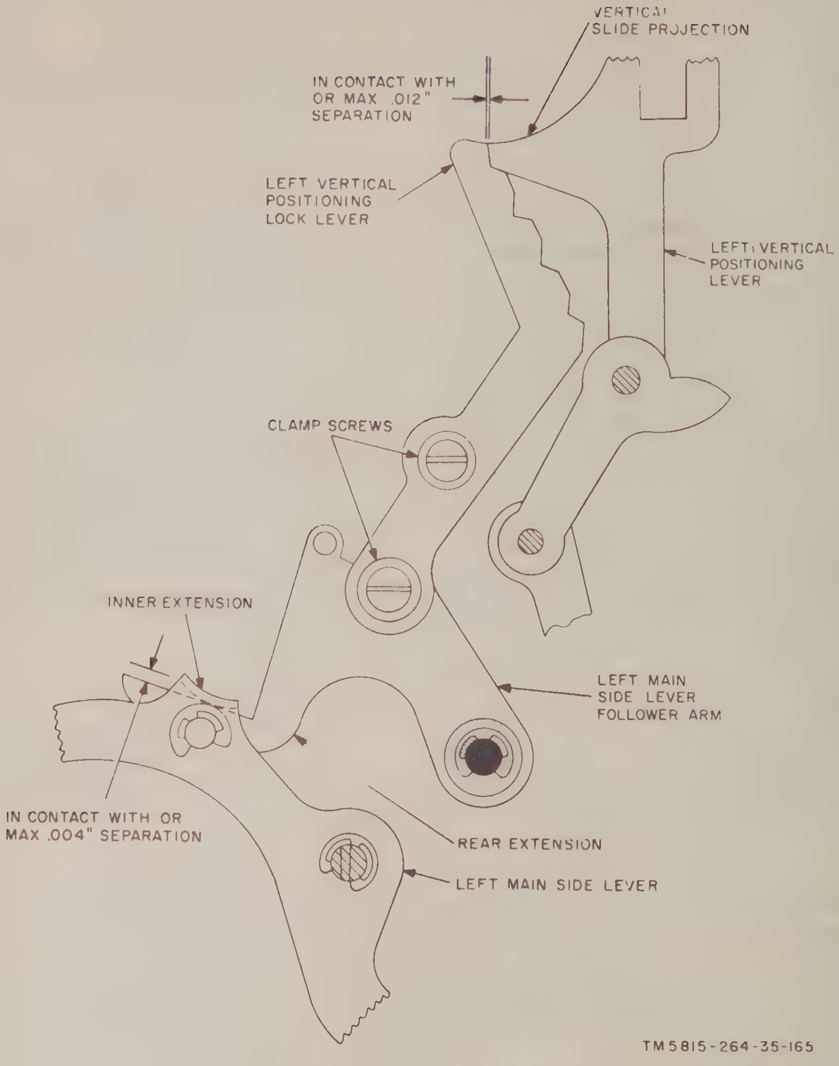

VERTICAL SLIDE PROJECTION
IN CONTACT WITH OR MAX .012" SEPARATION
LEFT VERTICAL POSITIONING LOCK LEVER
LEFT VERTICAL POSITIONING LEVER
CLAMP SCREWS
INNER EXTENSION
LEFT MAIN SIDE LEVER FOLLOWER ARM
IN CONTACT WITH OR MAX .004" SEPARATION
REAR EXTENSION
LEFT MAIN SIDE LEVER
TM5815-264-35-165

Figure 243. Vertical positioning mechanism, left side view.

c. Adjustment. Replace the tension pulley bail spring if it fails to meet the requirement.

302. Carriage Return Spring Adjustment (fig. 245)

a. Requirement. When the spacing drum (B) is in its returned position and the printing track is in its lowest position and the spacing feed pawls, transfer slide, and carriage return latch bail are held away from the spacing drum so that they do not affect its rotation, it should require 3 to 3¾ pounds to start the spring drum (A) moving.

b. Method of Checking. Apply the push end of a 4-pound scale to the edge of the rope clamp bushing and push tangent to the drum.

c. Adjustment. Loosen the spring drum nut. To increase tension, rotate the ratchet counterclockwise on the spring drum. To decrease tension, operate the escapement lever which

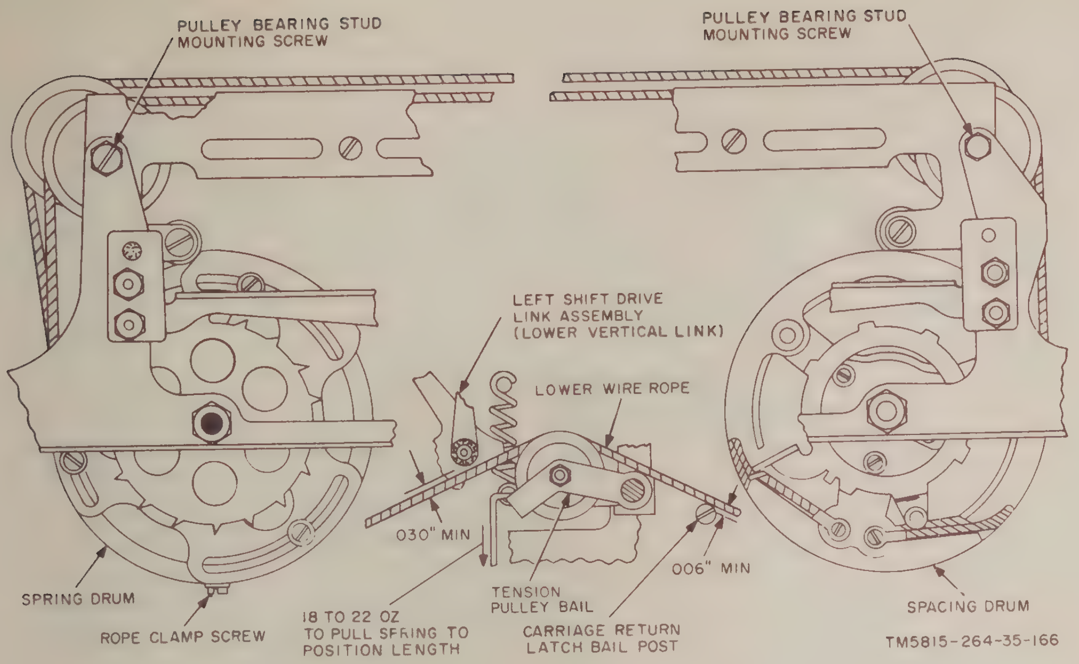

PULLEY BEARING STUD MOUNTING SCREW
PULLEY BEARING STUD MOUNTING SCREW
LEFT SHIFT DRIVE LINK ASSEMBLY (LOWER VERTICAL LINK)
LOWER WIRE ROPE
030" MIN
006" MIN
SPRING DRUM
ROPE CLAMP SCREW
18 TO 22 OZ TO PULL SPRING TO POSITION LENGTH
TENSION PULLEY BAIL
CARRIAGE RETURN LATCH BAIL POST
SPACING DRUM
TM5815-264-35-166

Figure 244. Spacing mechanism, front view.

allows the ratchet to rotate clockwise; tighten the spring drum nut. Check the related adjustment described in paragraph 327.

303. Spacing Feed Pawl Release Link Spring Tension

(C, fig. 245)

a. Requirement. It should require ½ to 2½ ounces to start the spacing feed pawl release link spring stretching.

b. Method of Checking. Apply the hook end of an 8-ounce scale to the front end of the release link extension and pull to the left.

c. Adjustment. Replace the spacing pawl release link spring if it fails to meet the requirement.

304. Carriage Return Latch Bail Adjustment

(C, fig. 245)

a. Requirement. When the printing carriage is fully returned, and the play in the carriage return bail taken up by holding the right side of the bail against its retainer, there should be a .004- to .040-inch clearance between the carriage return latch bail and the carriage return lever.

b. Method of Checking. Measure the clearance to obtain the requirement.

c. Adjustment. Loosen the clamp screw on the latch bail plate. Position the plate to obtain the requirement; tighten the clamp screw.

305. Carriage Return Latch Bail Spring Tension

(C, fig. 245)

a. Requirement. When the spacing drum is in its returned position, it should require 3 to 4½ ounces to start the carriage return latch bail moving.

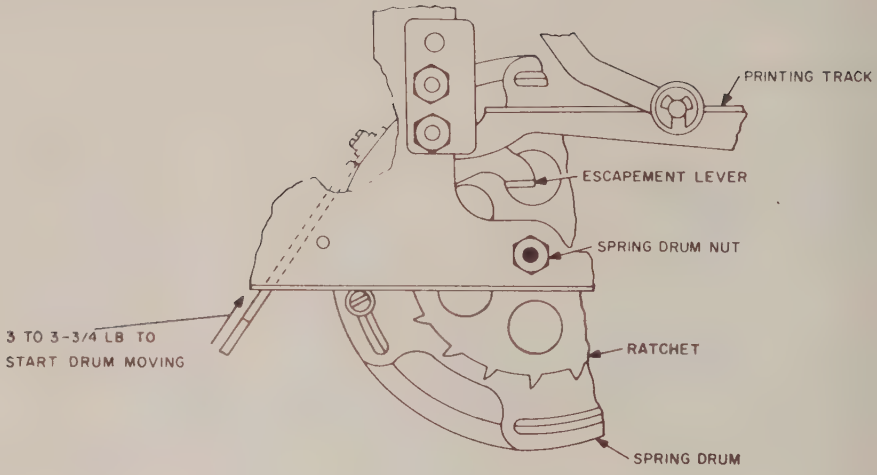
b. Method of Checking. Hook an 8-ounce scale on the lower end of latch bail spring extension and pull in line with the spring.

c. Adjustment. Replace the latch bail spring if it fails to meet the requirement.

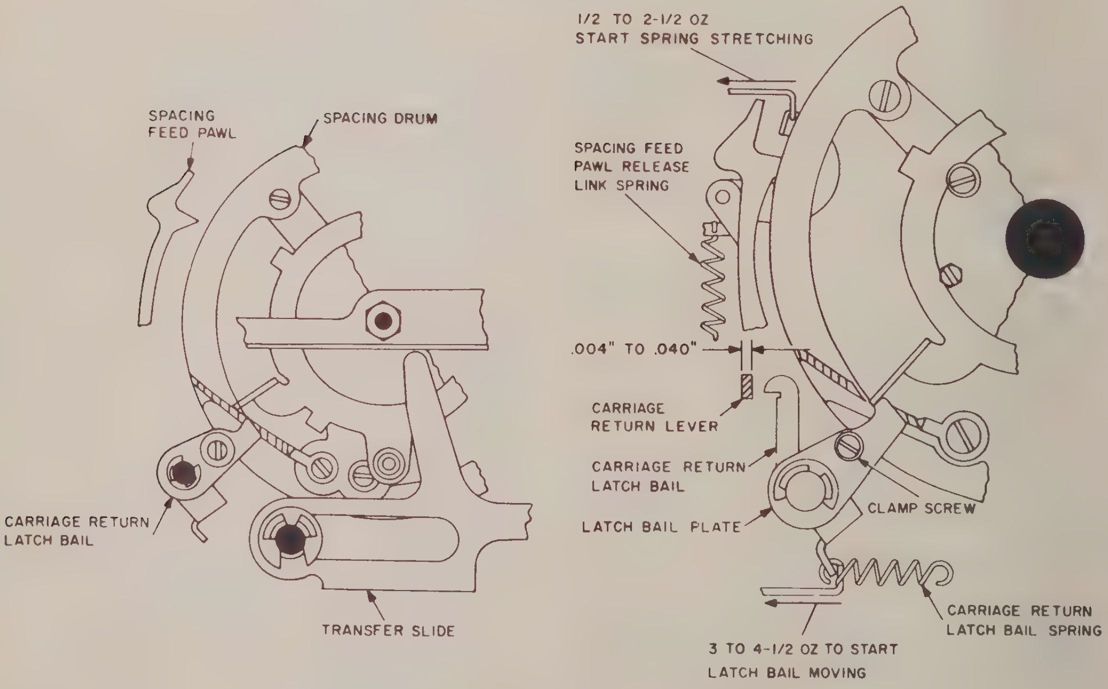
306. Carriage Return Lever Adjustment

(fig. 246)

a. Requirement. There should be a .006- to .035-inch clearance between the carriage return latch bail (B) and the carriage return lever, when the carriage return function pawl


PRINTING TRACK
ESCAPEMENT LEVER
SPRING DRUM NUT
3 TO 3-3/4 LB TO START DRUM MOVING
RATCHET
SPRING DRUM

A. FRONT VIEW


SPACING FEED PAWL
SPACING DRUM
CARRIAGE RETURN LATCH BAIL
TRANSFER SLIDE
1/2 TO 2-1/2 OZ START SPRING STRETCHING
SPACING FEED PAWL RELEASE LINK SPRING
.004" TO .040"
CARRIAGE RETURN LEVER
CARRIAGE RETURN LATCH BAIL
LATCH BAIL PLATE
CLAMP SCREW
CARRIAGE RETURN LATCH BAIL SPRING
3 TO 4-1/2 OZ TO START LATCH BAIL MOVING

B. FRONT VIEW

C. FRONT VIEW

TM5815-264-35-167

Figure 245. Carriage return mechanism.

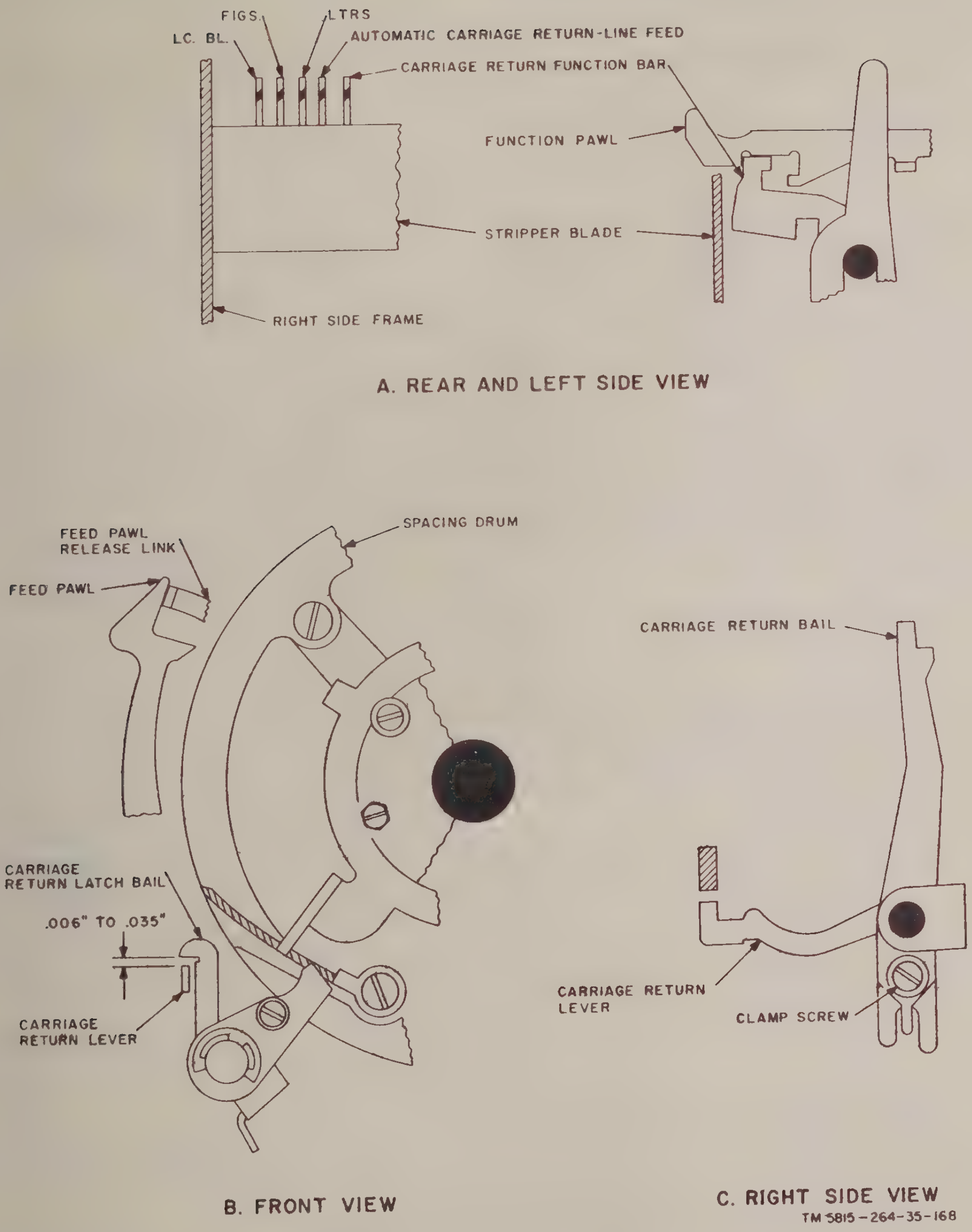

FIGS.
LTRS
LC. BL.
AUTOMATIC CARRIAGE RETURN-LINE FEED
CARRIAGE RETURN FUNCTION BAR
FUNCTION PAWL
STRIPPER BLADE
RIGHT SIDE FRAME
A. REAR AND LEFT SIDE VIEW
SPACING DRUM
FEED PAWL RELEASE LINK
FEED PAWL
CARRIAGE RETURN BAIL
CARRIAGE RETURN LATCH BAIL
.006" TO .035"
CARRIAGE RETURN LEVER
CARRIAGE RETURN LEVER
CLAMP SCREW
B. FRONT VIEW
C. RIGHT SIDE VIEW
TM 5815-264-35-168

Figure 246. Carriage return lever.

(A) is hooked over its function bar and the spacing drum (B) is held so the carriage return latch bail is in its latched position.

b. Method of Checking. Set up the carriage return combination on the selector. Rotate the main shaft until the function clutch cam disk stop lug is toward the bottom of the unit; measure the clearance.

c. Adjustment. Loosen the clamp screw (C) on the carriage return bail. Position the carriage return lever to obtain the requirement; tighten the clamp screw.

307. Dashpot Vent Screw Adjustment (A, fig. 247)

a. Requirement. The type box carriage should return from any length of line without bouncing.

b. Method of Checking. When the teletypewriter is operated at any speed from a source of automatic transmission with one carriage-return and one line-feed signal between lines, the first character of each line should be in the same location as if the unit was manually operated slowly.

c. Adjustment. Loosen the nut on the dashpot vent screw. Turn down the vent screw until a slight pneumatic bounce is perceptible. Back off the screw until the effect disappears. Then back the screw off one additional turn; tighten the nut.

308. Transfer Slide Spring Tension (A, fig. 247)

a. Requirement. When the transfer slide is in its extreme left-hand position, and the transfer slide spring is unhooked from the slide, it should require 3½ to 4½ ounces to pull the spring to its installed length.

b. Method of Checking. Hook an 8-ounce scale in the loop end and pull the spring to its installed length; replace the spring.

c. Adjustment. Replace the transfer slide spring if it fails to meet the requirement.

309. Keyboard Lock Lever Spring Tension (B, fig. 247)

a. Requirement. It should require ½ to 1½ ounces to start the keyboard lock lever moving.

b. Method of Checking. Turn the typing unit upside down. Hook an 8-ounce scale on the front arm of the keyboard lock lever, approximately at its midpoint, and pull upward.

c. Adjustment. Replace the keyboard lock lever spring if it fails to meet the requirement.

310. Left Margin Adjustment

a. Requirements.

(1) There should be $^{15}/_{16}$- to $1^{1}/_{16}$-inch clearance between the left edge of the platen (A, fig. 248), and the LTRS print indicator.

(2) There should be .002- to .015-inch clearance between the front spacing feed pawl (B, fig. 248) and the shoulder of the ratchet wheel tooth immediately ahead.

(3) The rear spacing feed pawl when farthest advanced, should rest at the bottom of an indentation between the ratchet wheel teeth.

b. Method of Checking.

(1) With the type box clutch disengaged and the spacing drum fully returned, shift the type box to the letters position and check the clearance specified in *a*(1) above with a 6-inch rule.

(2) Disengage the spacing clutch. With the front spacing feed pawl farthest advanced and the spacing drum fully returned, take up the play in the spacing shaft gear (fig. 231) in a clockwise direction. Measure the clearance specified in *a*(2) above, and check the requirement described in *a*(3) above.

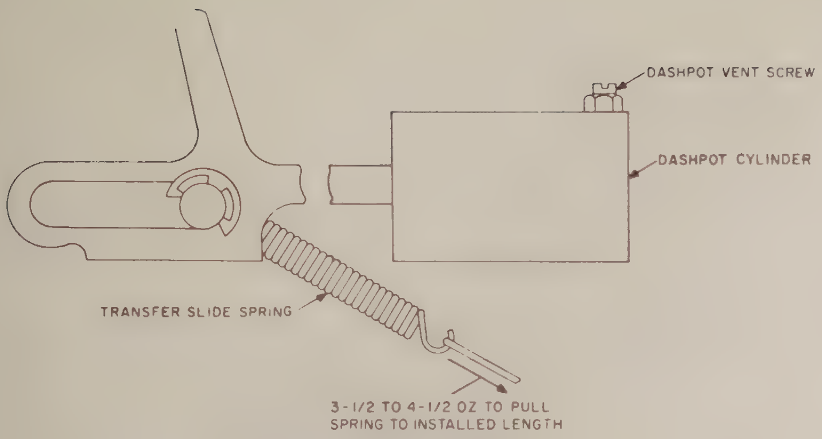
c. Adjustment. Shift the type box to the letters position. Return the printing carriage to its left position. Loosen the four indicated mounting screws on the carriage return ring (B, fig. 248). Hold the ring in its counterclockwise position. Locate the type box so that its LTRS print indicator is in the required position; tighten the four mounting screws. Check the related adjustments described in paragraphs 312 and 359.

Note. For lines other than 72 characters in length, the margin may be varied as required. The range of adjustment is 0 to 85 characters.

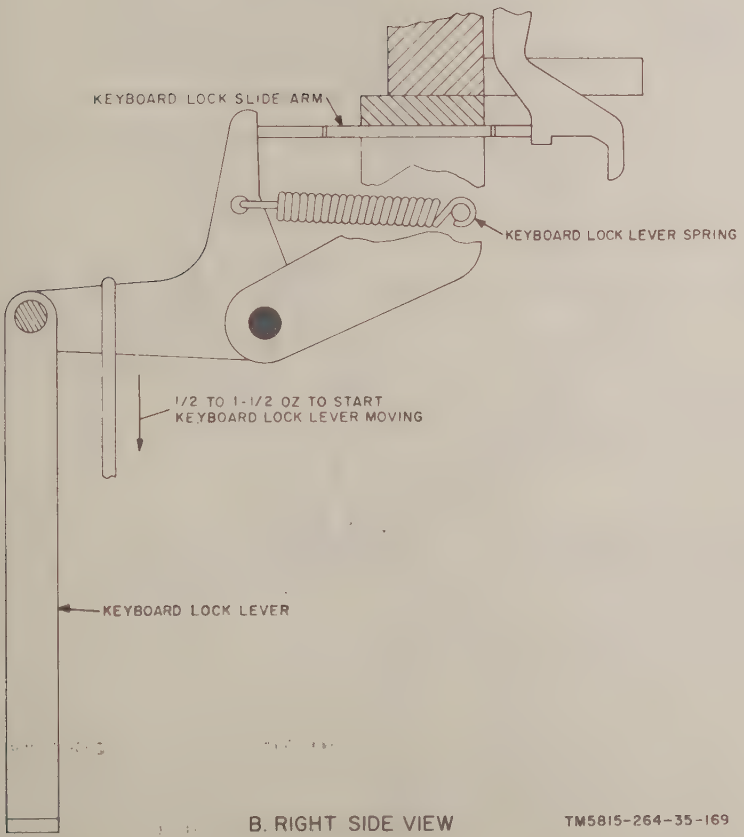
311. Automatic Carriage Return-Line Feed Bell Crank Spring Tension (B, fig. 248)

a. Requirement. When the function clutch is disengaged, it should require 6½ to 11 ounces to move the automatic carriage return-line feed bell crank.

b. Method of Checking. Hook a 32-ounce scale on the upper end of the bell crank, at the bend, immediately in front of the front plate and pull toward the right.

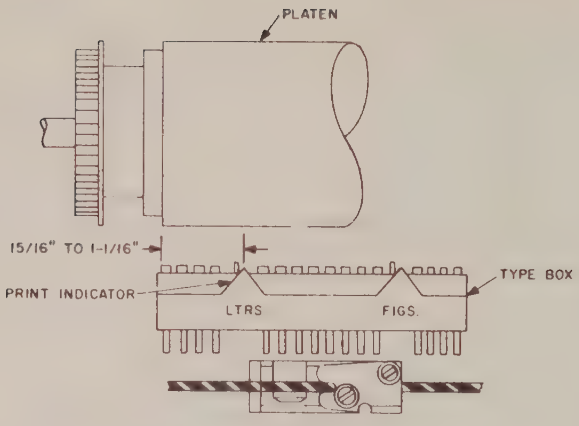

DASHPOT VENT SCREW
DASHPOT CYLINDER
TRANSFER SLIDE SPRING
3-1/2 TO 4-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH

A FRONT VIEW

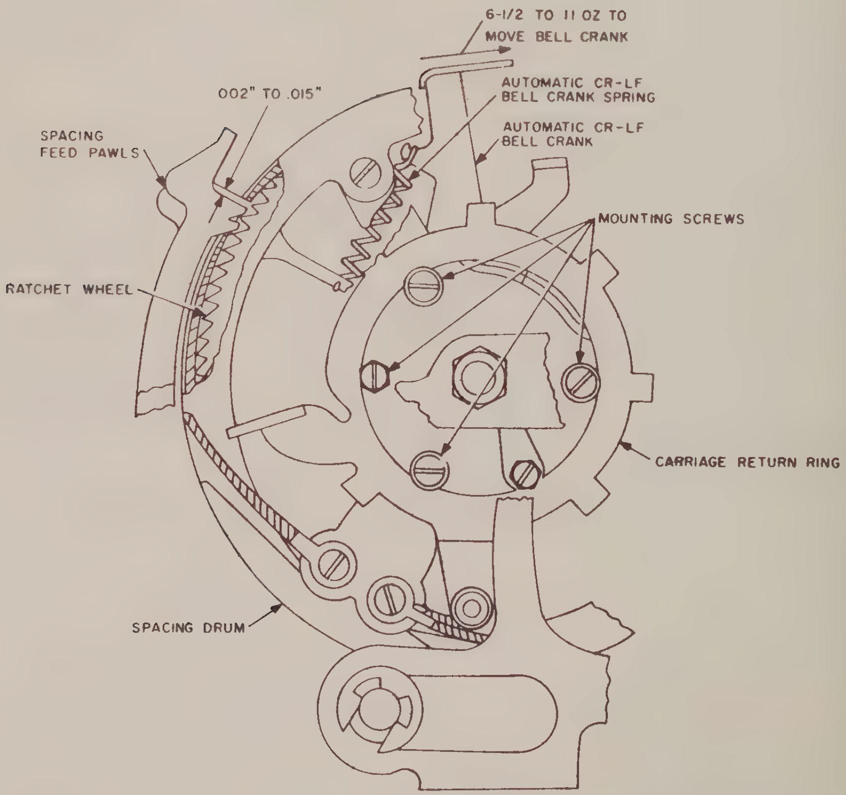

KEYBOARD LOCK SLIDE ARM
KEYBOARD LOCK LEVER SPRING
1/2 TO 1-1/2 OZ TO START KEYBOARD LOCK LEVER MOVING
KEYBOARD LOCK LEVER
TM5815-264-35-169

B. RIGHT SIDE VIEW

Figure 247. Dashpot and keyboard lock mechanisms.


PLATEN
15/16" TO 1-1/16"
PRINT INDICATOR
TYPE BOX
LTRS
FIGS.

A. TOP VIEW


6-1/2 TO 11 OZ TO MOVE BELL CRANK
002" TO .015"
AUTOMATIC CR-LF BELL CRANK SPRING
SPACING FEED PAWLS
AUTOMATIC CR-LF BELL CRANK
MOUNTING SCREWS
RATCHET WHEEL
CARRIAGE RETURN RING
SPACING DRUM

B. FRONT VIEW

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Figure 248. Carriage return mechanism.

c. Adjustment. Replace the automatic carriage return-line feed bell crank spring if it fails to meet the requirements.

312. Right Margin Adjustment
(A, fig. 249)

a. Requirement. With the type box clutch disengaged and the front spacing pawl farthest advanced, position the printing carriage two spaces before the character on which the automatic carriage return-line feed is to occur. There should be .040- to .055-inch clearance between the extension on the bell crank and the automatic carriage return-line feed ring.

b. Method of Checking. Check the clearance specified in the requirement with a round wire gage.

c. Adjustment. Loosen the four indicated mounting screws on the carriage return ring. Position the automatic carriage return-line feed ring to obtain the requirement; tighten the four mounting screws.

Note. The range of line adjustment is from 0 to 85 characters.

313. Horizontal Motion Stop Slide Spring Tension

a. Requirements. When the code bars are in the marking position (left), the type box clutch rotated ¼ turn from its stop position, and the decelerating slides (fig. 242) held away from the horizontal motion stop slides, the following requirements should be met:

(1) It should require 1¾ to 3 ounces to to start the middle (common) horizontal motion stop slide (B, fig. 259) moving.

(2) It should require ½ to 1½ ounces to start the upper and lower horizontal motion stop slides moving.

b. Method of Checking. Measure the specified tensions in requirements *a*(1) and (2) above as follows:

(1) Hook an 8-ounce scale over the left end of the middle slide and pull forward.

(2) Hold the middle slide $\frac{1}{32}$ inch forward away from the upper and lower slides. Hook the scale over the right end of the upper slide and pull forward.

(3) Repeat *b*(2) above, except hook the scale over the right end of the lower slide and pull forward.

c. Adjustment. Replace the upper, middle, or lower horizontal motion stop slide spring if it fails to meet the requirements.

314. Printing Carriage Lower Roller Adjustment
(A, fig. 250)

a. Requirement. There should be a minimum vertical play, without bind, of the printing carriage on its track.

b. Method of Checking. Move the type box to its extreme right hand position. Loosen the printing carriage upper wire rope clamp screws and move the carriage along its track through its full travel.

c. Adjustment. Loosen the nut on the eccentric about ⅙ turn. Rotate the eccentric to obtain the requirements. Keep the high part of the eccentric (chamfered corner) toward the right; tighten the nut. Reposition the printing carriage toward its right hand position; tighten the wire rope clamp screws. Check the related adjustments described in paragraphs 321, 326, and 327.

315. Type Box Carriage Roller Arm Spring Tension
(B, fig. 250)

a. Requirement. It should require 28 to 36 ounces to start the upper roller, nearest the type box latch, moving away from the carriage track.

b. Method of Checking. Hook a 64-ounce scale over the type box latch, just to the right of the locking detent, and pull upward.

c. Adjustment. Replace the type box carriage roller arm spring if it fails to meet the requirements.

316. Decelerating Slide Spring Tension
(C, fig. 250)

a. Requirement. It should require ½ to 1½ ounces to start the decelerating slide moving.

b. Method of Checking.

(1) With the printing track in its extreme

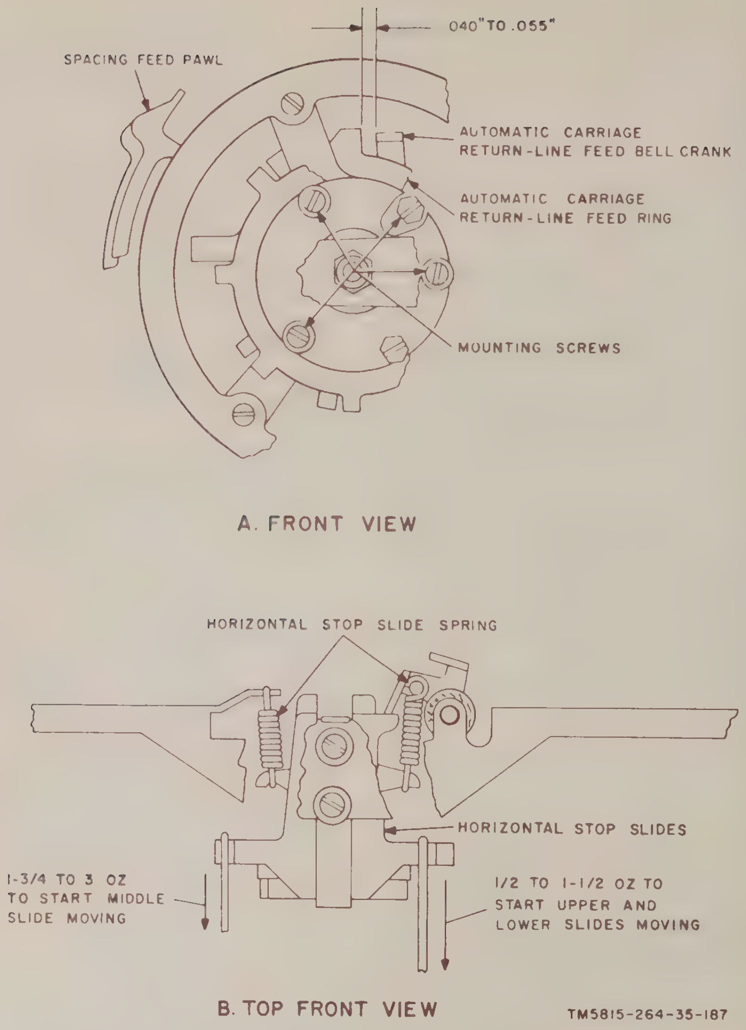

040" TO .055"
SPACING FEED PAWL
AUTOMATIC CARRIAGE RETURN-LINE FEED BELL CRANK
AUTOMATIC CARRIAGE RETURN-LINE FEED RING
MOUNTING SCREWS
A. FRONT VIEW
HORIZONTAL STOP SLIDE SPRING
HORIZONTAL STOP SLIDES
1-3/4 TO 3 OZ TO START MIDDLE SLIDE MOVING
1/2 TO 1-1/2 OZ TO START UPPER AND LOWER SLIDES MOVING
B. TOP FRONT VIEW
TM5815-264-35-187

Figure 249. Right margin and horizontal motion stop mechanism.

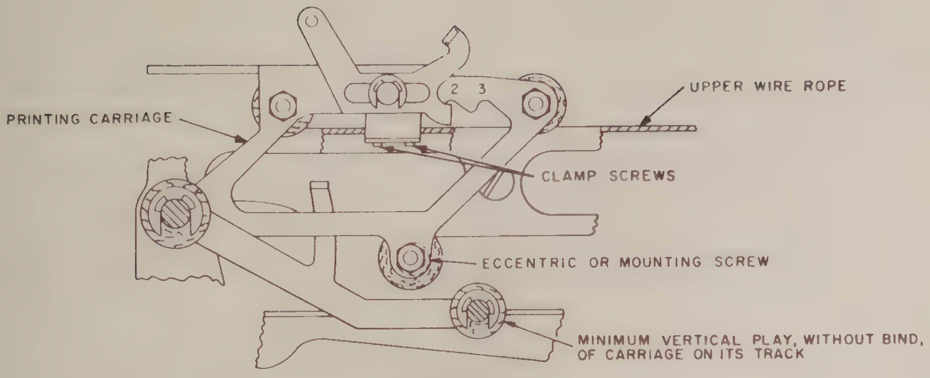
downward position and the printing carriage and decelerating slide assembly in the right hand position, hook an 8-ounce scale over the end of the right hand decelerator slide and pull to the left.

(2) With the printing track in its extreme downward position and the printing carriage and decelerating slide assembly in the left hand position, hook an 8-ounce scale over the end of the left hand decelerating slide and pull to the right.

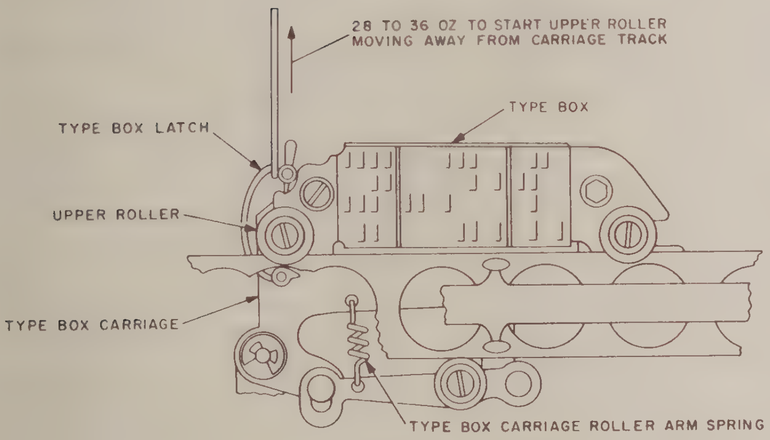
c. Adjustment. Replace the left and/or right decelerating slide spring if it fails to meet the requirements.

317. Printing Carriage Position Adjustment (A, fig. 251)

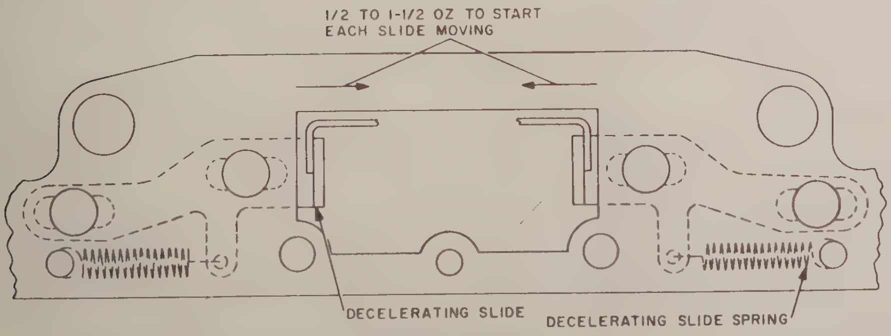
a. Requirement. When the type of box is in the letters position, move the printing carriage to the approximate mid-point of the platen, the "M" type pallet should be in approximate alignment with the center of the printing hammer when the hammer is just touching the type pallet.


UPPER WIRE ROPE
PRINTING CARRIAGE
2
3
CLAMP SCREWS
ECCENTRIC OR MOUNTING SCREW
MINIMUM VERTICAL PLAY, WITHOUT BIND, OF CARRIAGE ON ITS TRACK

A. FRONT VIEW


28 TO 36 OZ TO START UPPER ROLLER MOVING AWAY FROM CARRIAGE TRACK
TYPE BOX
TYPE BOX LATCH
UPPER ROLLER
TYPE BOX CARRIAGE
TYPE BOX CARRIAGE ROLLER ARM SPRING

B. FRONT VIEW


1/2 TO 1-1/2 OZ TO START EACH SLIDE MOVING
DECELERATING SLIDE
DECELERATING SLIDE SPRING

C. FRONT VIEW

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Figure 250. Printing and type box carriage and decelerating slide mechanisms.

b. Method of Checking. Set up the letter "M" combination on the selector. Rotate the main shaft until the type box is in the printing position and the printing hammer just strikes the pallet. Move the hammer toward the pallet to check the requirement.

c. Adjustment. Loosen the upper wire rope clamp screws. Take up the play in the type box by moving it alternately to the left and right. Position the printing carriage so that the printing hammer is set at approximately the center of the play; tighten the clamp screws. Check the related adjustment described in paragraph 297.

318. Printing Hammer Bearing Stud Adjustment
(B, fig. 251)

a. Requirement. When the printing hammer is in contact with the period (.) type pallet, the face of the hammer should be fully on the end of the type pallet when play is taken up by pressing downward at the bearing stud.

b. Method of Checking. Set the type box in the figures position and move the printing carriage to the approximately mid-point of the platen. Set up the "M" combination on the selector. Rotate the main shaft until the type box is in the printing position and the printing hammer just strikes the type pallet. Press downward at the bearing stud and move the hammer toward the pallet to check the requirement.

c. Adjustment. Remove the locking nut and bearing stud. Add or remove shims between the shoulder on the bearing stud and stop bracket. Replace the stud and locking nut.

319. Oscillating Rail Shift Link Assembly Adjustment
(fig. 252)

a. Requirement. When the type box (A) is in position to print the letter "M" and is then shifted to the figures position, the period (.) type pallet should be in approximate alignment with the center of the printing hammer when the hammer is just touching the type pallet.

b. Method of Checking. Set the type box in the letters position and move the printing carriage to the approximate mid-point of the platen. Set up the letter "M" combination on the selector. Rotate the main shaft until the type box is in the printing position and the printing hammer just strikes the type pallet. Manually buckle the right oscillating rail link assembly (C), and shift the type box to the left. Move the printing hammer toward the period type pallet to check the requirement.

c. Adjustment.

(1) Loosen the two clamp screws on the left oscillating rail shift link assembly (B). Position the shift link assembly on the oscillating rail to obtain the requirement; tighten the clamp screws.

(2) Shift the type box alternately from "M" to period. Take up the play in each direction. Refine the adjustment described above, if necessary.

320. Oscillating Rail Shift Link Assembly Spring Tension
(fig. 252)

a. Requirement. When the right or the left oscillating rail shift link assembly is in the straight or unbuckled position, the following requirements should be met:

(1) It should require 7 to 14 ounces to start the right oscillating rail shift link assembly (C) moving.

(2) It should require 7 to 14 ounces to start the left oscillating rail shift link assembly (B) moving.

b. Method of Checking.

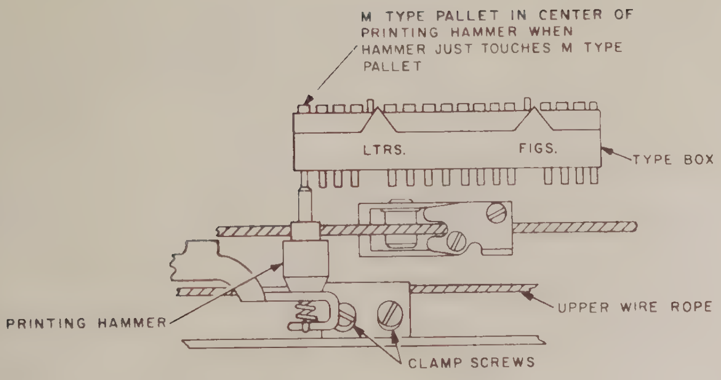
(1) Hook a 32-ounce scale under the left shift link assembly adjacent to the formed rearward extension and pull upward.

(2) Hook a 32-ounce scale under the right shift link assembly adjacent to the formed rearward extension and pull upward.

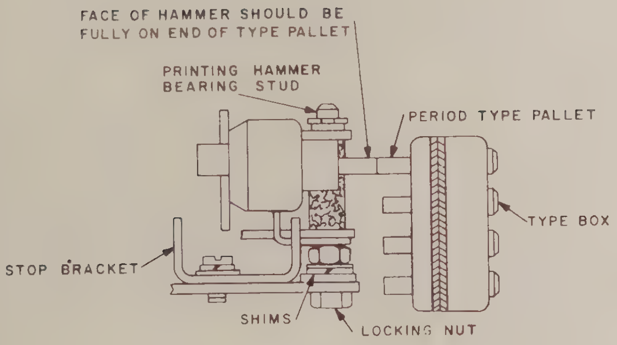
c. Adjustment. Replace the left and/or right oscillating rail shift link assembly spring if it fails to meet the requirement.

321. Printing Track Adjustment
(fig. 253)

a. Requirement. With the the printing track in its extreme downward position and the


M TYPE PALLET IN CENTER OF PRINTING HAMMER WHEN HAMMER JUST TOUCHES M TYPE PALLET
LTRS.
FIGS.
TYPE BOX
UPPER WIRE ROPE
PRINTING HAMMER
CLAMP SCREWS

A. TOP VIEW


FACE OF HAMMER SHOULD BE FULLY ON END OF TYPE PALLET
PRINTING HAMMER BEARING STUD
PERIOD TYPE PALLET
TYPE BOX
STOP BRACKET
SHIMS
LOCKING NUT

B. RIGHT SIDE VIEW

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Figure 251. Printing carriage.

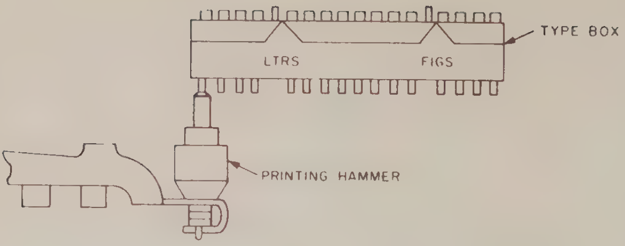
printing hammer operating bail latching extension held with its left side in line with the latch shoulder, there should be .015- to .040-inch clearance between the latch extension and the rear surface of the operating bail latch.

b. Method of Checking.

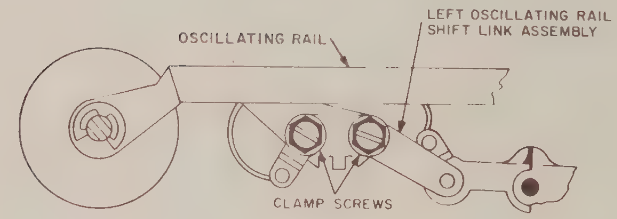
(1) Position the printing arm slide over the mounting screw on the left-hand side of the printing track. With the type box shifted to the figures position, set up the blank combination on the selector and rotate the main shaft until the printing track is in its lowest downward position. Check the requirement described in *a* above.

(2) Repeat the procedure described in (1) above except position the printing arm slide over the mounting screw on the right-hand side of the printing track.

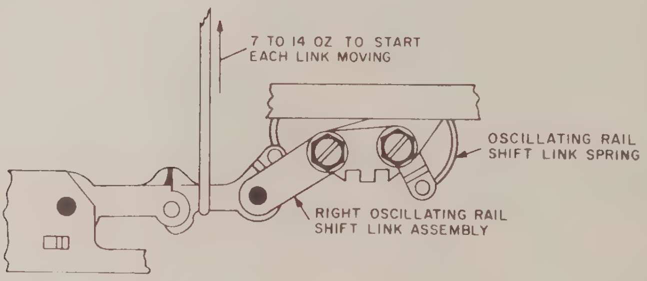
c. Adjustment. Loosen the mounting screws on the printing track. Position the track up or


TYPE BOX
LTRS
FIGS
PRINTING HAMMER

A. TOP VIEW


LEFT OSCILLATING RAIL SHIFT LINK ASSEMBLY
OSCILLATING RAIL
CLAMP SCREWS

B. FRONT VIEW


7 TO 14 OZ TO START EACH LINK MOVING
OSCILLATING RAIL SHIFT LINK SPRING
RIGHT OSCILLATING RAIL SHIFT LINK ASSEMBLY

C. FRONT VIEW

TM5815-264-35-190

Figure 252. Shift mechanism.

down to obtain the requirement; tighten the mounting screws. Check the related adjustment described in paragraph 327.

322. Printing Hammer Plunger Spring Tension (fig. 253)

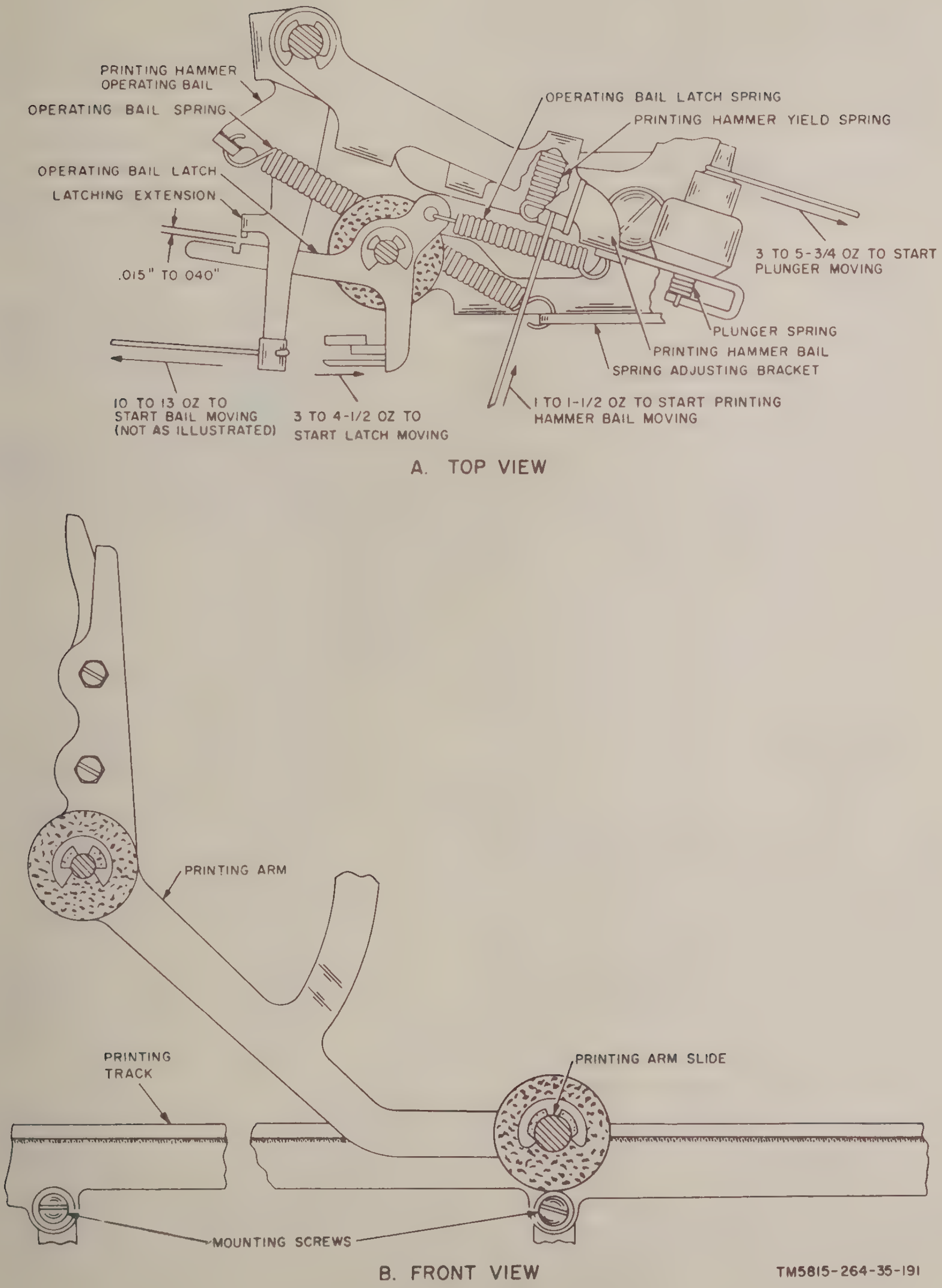
a. Requirement. It should require 3 to 5¾ ounces to start the printing hammer plunger moving.

b. Method of Checking. Hook an 8-ounce scale on the plunger against its shoulder and pull at a right angle to the plunger.

c. Adjustment. Replace the plunger spring if it fails to meet the requirement.

323. Printing Hammer Operating Bail Spring Tension (fig. 253)

a. Requirement. It should require 10 to 13 ounces to start the printing operating bail moving.


PRINTING HAMMER OPERATING BAIL
OPERATING BAIL SPRING
OPERATING BAIL LATCH
LATCHING EXTENSION
.015" TO 040"
OPERATING BAIL LATCH SPRING
PRINTING HAMMER YIELD SPRING
3 TO 5-3/4 OZ TO START PLUNGER MOVING
PLUNGER SPRING
PRINTING HAMMER BAIL
SPRING ADJUSTING BRACKET
10 TO 13 OZ TO START BAIL MOVING (NOT AS ILLUSTRATED)
3 TO 4-1/2 OZ TO START LATCH MOVING
1 TO 1-1/2 OZ TO START PRINTING HAMMER BAIL MOVING
PRINTING ARM
PRINTING TRACK
PRINTING ARM SLIDE
MOUNTING SCREWS
TM5815-264-35-191

A. TOP VIEW

B. FRONT VIEW

Figure 253. Printing mechanism.

b. Method of Checking. Remove the printing hammer yield spring. With the spring adjusting bracket in the left (No. 1) notch, rotate the main shaft until the operating bail is in its latched position. Hook a 32-ounce scale over the front end of the bail arm and pull toward the left. Replace the printing hammer yield spring.

c. Adjustment. Replace the printing hammer operating bail spring if it fails to meet the requirements.

324. Printing Hammer Yield Spring Tension (fig. 253)

a. Requirement. When the printing ham-operating bail is resting against its stop, it should require 1 to 2½ ounces to start the printing hammer bail moving.

b. Method of Checking. Apply the push end of an 8-ounce scale against the front edge of the printing hammer bail directly above the yield spring. Push in a line parallel with the spring.

c. Adjustment. Replace the printing hammer yield spring if it fails to meet the requirement.

325. Printing Hammer Operating Bail Latch Spring Tension (fig. 253)

a. Requirement. When the printing track is in its maximum upper position, it should require 3 to 4½ ounces to start the operating bail latch moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the left edge of the latch near the front end of its forward extension. Push to the right.

c. Adjustment. Replace the operating bail spring if it fails to meet the requirement.

326. Printing Hammer Stock Bracket Adjustment (A, fig. 254)

a. Requirement. With the type box in position to print the letter "M" and the printing track in its maximum downward position, there should be .005- to .035-inch clearance between the printing hammer and the "M" type pallet when the printing hammer stop bracket is held toward the platen with 8 ounces of pressure.

b. Method of Checking.

(1) Place the printing carriage in its fully returned position.. Setup the letter "M" combination on the selector and rotate the main shaft until the printing track is in its maximum downward position. Place the push end of an 8-ounce scale to the printing hammer stop bracket at the base of the spring earform and apply a pressure of 8 ounces toward the platen; measure the specified clearance.

(2) Repeat the procedure described in (1) above except move the printing carriage to the extreme right end of the platen.

c. Adjustment. Loosen the mounting screw on the stop bracket. Position the bracket to obtain the requirement; tighten the mounting screw. Check the related adjustment described in paragraph 327.

327. Printing Arm Adjustment

a. Requirement.

(1) When the printing track is in its maximum downward position and the printing hammer operating bail is resting against its stop (A, fig. 254) there should be .001- to .015-inch clearance between the secondary printing arm (B, fig. 254) and the forward extension of the printing hammer operating bail.

(2) When the printing track is in its uppermost position, the latching extension of the printing hammer operating bail should overtravel the latching surface of the operating bail latch by at least .006 inch.

b. Method of Checking. The clearances specified in requirements *a*(1) and (2) above should be checked with the printing arm slide (fig. 253) positioned over the mounting screw on the left-hand side of the printing track, then with the printing arm slide positioned over the mounting screw on the right-hand side.

(1) Rotate the main shaft until the printing track is in its maximum downward position and the printing hammer operating bail is resting against its

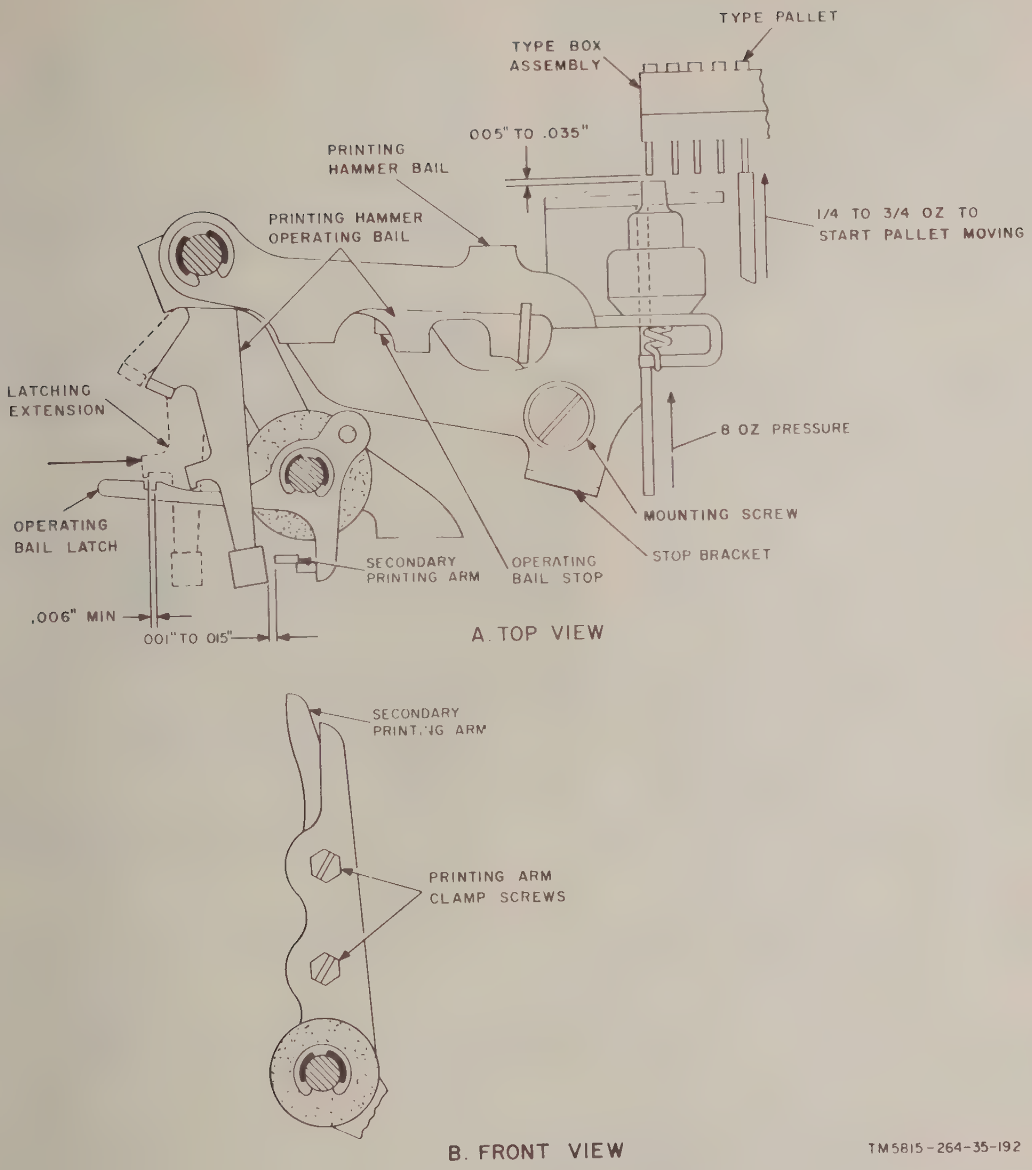

TYPE PALLET
TYPE BOX ASSEMBLY
.005" TO .035"
PRINTING HAMMER BAIL
PRINTING HAMMER OPERATING BAIL
1/4 TO 3/4 OZ TO START PALLET MOVING
LATCHING EXTENSION
8 OZ PRESSURE
OPERATING BAIL LATCH
MOUNTING SCREW
STOP BRACKET
SECONDARY PRINTING ARM
OPERATING BAIL STOP
.006" MIN
.001" TO .015"
A. TOP VIEW
SECONDARY PRINTING ARM
PRINTING ARM CLAMP SCREWS
B. FRONT VIEW
TM5815-264-35-192

Figure 254. Printing mechanism.

stop. Hold the printing arm slide downward over the printing track mounting screw to make the clearance a maximum. Check the requirement in *a*(1) above, at the left and right positions, with a round wire gage.

(2) Rotate the main shaft until the printing track is in its uppermost position. Check the requirements in *a*(2) above at the left and right positions.

c. Adjustment. Loosen the clamp screws on the printing arm. Position the arm to obtain the requirements in *a*(1) and (2) above; tighten the clamp screws.

Note. The printing arm adjustment should always be made with the printing hammer operating bail spring bracket in the No. 1 position. Positions No. 2 and 3 are to be used only for making multiple copies.

328. Type Pallet Spring Tension
(A. fig. 254)

a. Requirement. It should require ¼ to ¾ ounce to start the type pallet moving.

b. Method of Checking. Remove the type box from the printing carriage. Apply an 8-ounce push scale vertically to the end of the pallet shank and push upward. Measure the tension of all pallet springs; replace the type box.

c. Adjustment. Replace any type pallet spring that fails to meet the requirements.

329. Type Box Alignment Adjustment
(fig. 255)

a. Requirements. The printed impression at the top and bottom of the characters should be equal.

b. Method of Checking. Operate the teletypewriter under power. Repeat the characters E and Z and visually check the requirement.

c. Adjustment. With the equipment de-energized and the type box in its uppermost position, loosen the locknut on the adjusting screw. Operate the teletypewriter under power, repeating the characters E and Z. Turn the

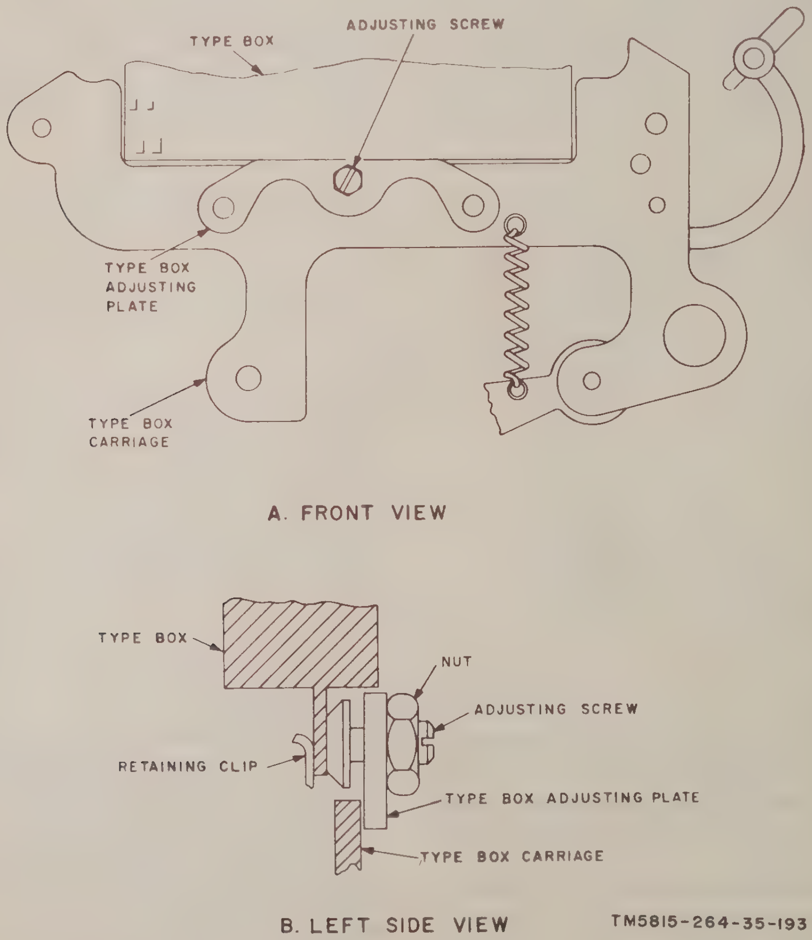

ADJUSTING SCREW
TYPE BOX
TYPE BOX ADJUSTING PLATE
TYPE BOX CARRIAGE
A. FRONT VIEW
TYPE BOX
NUT
ADJUSTING SCREW
RETAINING CLIP
TYPE BOX ADJUSTING PLATE
TYPE BOX CARRIAGE
B. LEFT SIDE VIEW
TM5815-264-35-193

Figure 255. Type box.

adjusting screw in or out (in steps of about ¼ turn for each trail) to obtain the requirement. Turn the screw in to increase the impression at the bottom of the character. Turn the screw out to increase the impression at the top of the character. Tighten the locknut. Recheck the adjustment described in paragraph 326, and readjust if necesary.

Note. Some typing units are equipped with a ribbon guide which has a type box retaining clip with a limited yield. In cases where it is necessary to back the adjusting screw out to provide heavier printing at the top of a character, it may be necessary to bend the spring clip on the ribbon guide toward the front so that the tab at the bottom of the type box is held against the head of the adjusting nut.

330. Ribbon Reverse Spur Gear Adjustment
(A, fig. 256)

a. Requirement. When the right ribbon reversing lever is in its maximum downward position, the left ribbon reversing lever should be in its maximum upward position.

b. Adjustment. Loosen the two setscrews in the hub of the detent link. Loosen the left spur gear nut. Securely tighten the right spur gear nut. Move the right reversing lever to its maximum downward position and hold the left reversing lever in its maximum upward position; tighten the left spur gear nut. Check the related adjustment described in paragraph 331.

331. Ribbon Reverse Detent Link Adjustment
(B, fig. 256)

a. Requirement. When the detent link is buckled in its downward position, there should be .001- to .005-inch clearance between the detent link and the ribbon reverse detent lever when play in the detent lever is taken up lightly toward the right side of the typing unit.

b. Adjustment. Hold the left ribbon reversing lever in its maximum downward position. Position the detent link to obtain the requirement and tighten the upper setscrew in the hub of the detent link. Buckle the detent link upward and tighten the lower setscrew.

332. Ribbon Reverse Detent Lever Spring Tension
(C, fig. 256)

a. Requirement. When the detent link buckled is in its upward position, it should require 10 to 18 ounces to start the ribbon reverse detent lever moving toward the rear.

b. Method of Checking. Hook a 32-ounce scale over the ribbon reverse detent lever, just below the spring, and pull toward the rear.

c. Adjustment. Replace the detent lever spring if it fails to meet the requirement.

333. Ribbon Feed Lever Bracket Adjustment
(fig. 257)

a. Requirements.

(1) *Left-hand mechanism.* When the left ribbon reversing lever is in its maximum upward position and the ribbon mechanism is in its maximum upper position, there should be .015- to .035-inch clearance between the front face of the ratchet feed lever and the shoulder of a tooth on the ratchet when the ratchet wheel is held against the ratchet detent lever.

(2) *Right-hand mechanism.* When the right ribbon reversing lever is in its maximum upward position and the ribbon mechanism is in its maximum upper position, there should be .015- to .035-inch clearance between the front face of the ratchet feed lever and the shoulder of a tooth on the ratchet when the ratchet wheel is held against the ratchet detent lever.

b. Method of Checking.

(1) *Left-hand mechanism.* With the left reversing lever in maximum upward position, rotate the main shaft until the ribbon mechanism is in its maximum upward position. Hold the ratchet wheel against the ratchet detent lever and measure the clearance specified in requirements *a*(1) above with a round wire gage.

(2) *Right-hand mechanism.* With the ratchet reversing lever in its maximum upward position and the ribbon mechanism in its maximum upward position, check the clearance in *a*(2) above as described in (1) above.

c. Adjustments.

(1) *Left-hand mechanism.* Loosen the two

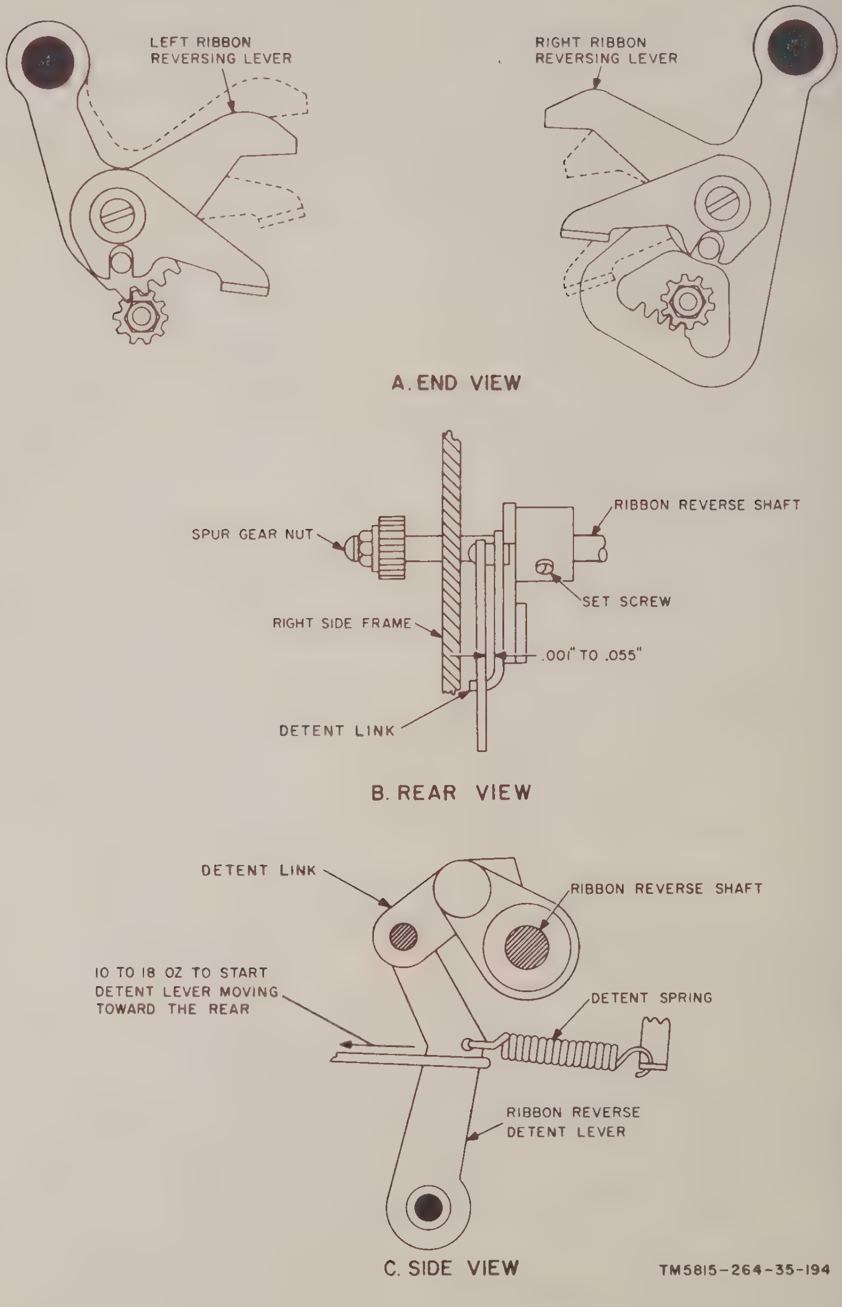

LEFT RIBBON REVERSING LEVER
RIGHT RIBBON REVERSING LEVER
A. END VIEW
RIBBON REVERSE SHAFT
SPUR GEAR NUT
SET SCREW
RIGHT SIDE FRAME
.001" TO .055"
DETENT LINK
B. REAR VIEW
DETENT LINK
RIBBON REVERSE SHAFT
10 TO 18 OZ TO START DETENT LEVER MOVING TOWARD THE REAR
DETENT SPRING
RIBBON REVERSE DETENT LEVER
C. SIDE VIEW
TM5815-264-35-194

Figure 256. Ribbon reverse mechanism.

mounting screws on the left ratchet feed lever bracket. Position the bracket to obtain requirements in *a*(1) above; tighten the mounting screws. Rotate the main shaft. The ratchet wheel should step one tooth only with each operation.

(2) *Right-hand mechanism.* Loosen the two mounting screws on the right ratchet feed lever bracket. Position the bracket to obtain requirements in *a*(2) above; tighten the mounting screws. Rotate the main shaft. The ratchet should step one tooth only with each operation.

334. Ribbon Ratchet Feed Lever and Ratchet Detent Lever Spring Tension

(fig. 257)

a. Requirement. With the ratchet feed lever and the ratchet detent lever in its uppermost position, it should require a force of ¾- to 2 ounces pressure to start the levers moving.

b. Method of Checking.

(1) *Ratchet feed lever.* Apply the push end of an 8-ounce scale to the ratchet feed lever near the ratchet feed lever spring and push downward. Measure the ratchet feed lever spring tension on both the left and the right ribbon feed mechanisms.

(2) *Ratchet detent lever.* On the ratchet detent lever, apply the push end of the 8-ounce scale at a point directly to the left or right of the ratchet feed lever spring and push downward. Measure the ratchet detent lever spring tension on both the left and the right ribbon feed mechanisms.

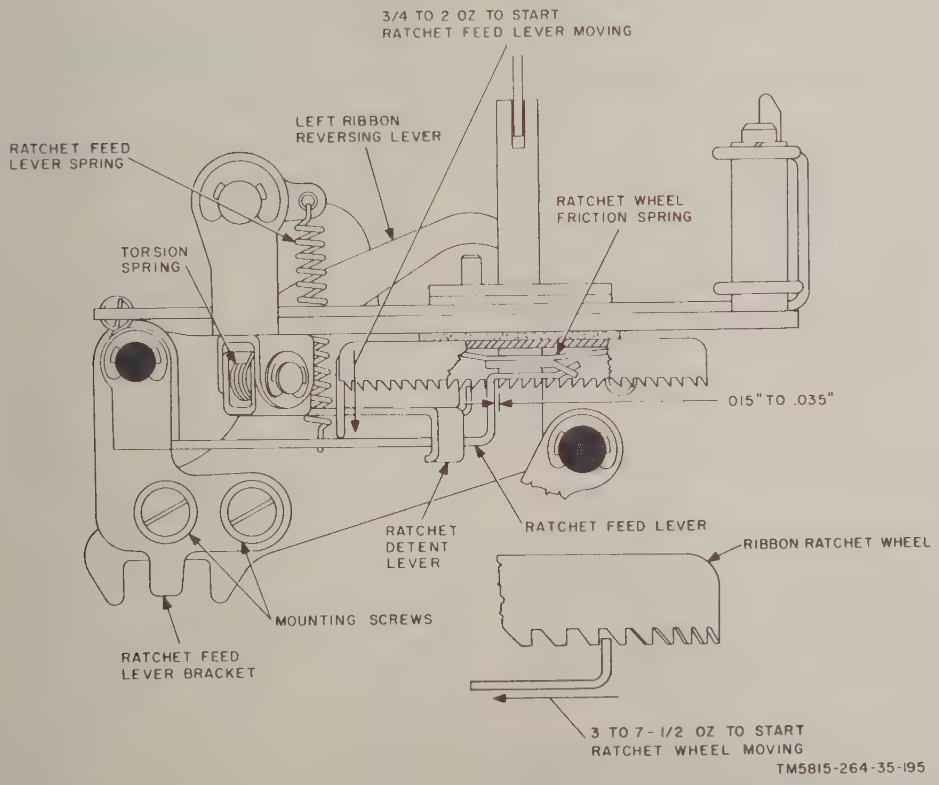

3/4 TO 2 OZ TO START RATCHET FEED LEVER MOVING
LEFT RIBBON REVERSING LEVER
RATCHET FEED LEVER SPRING
RATCHET WHEEL FRICTION SPRING
TORSION SPRING
.015" TO .035"
RATCHET DETENT LEVER
RATCHET FEED LEVER
RIBBON RATCHET WHEEL
MOUNTING SCREWS
RATCHET FEED LEVER BRACKET
3 TO 7-1/2 OZ TO START RATCHET WHEEL MOVING
TM5815-264-35-195

Figure 257. Ribbon feed mechanism, left side view.

c. Adjustment.

(1) Replace the ratchet feed lever spring if it fails to meet the requirements.

(2) If the minimum requirement on the ratchet detent lever cannot be met, adjust the torsion spring by pulling its lower end to the rear to obtain the requirement.

335. Ribbon Ratchet Wheel Friction Spring Tension

(fig. 257)

a. Requirement. When the ratchet feed lever and ratchet detent lever are disengaged, it should require 3 to 7½ ounces to start the ribbon ratchet wheel moving.

b. Method of Checking. Hook an 8-ounce scale on a tooth in the ribbon ratchet wheel and pull tangent to the ribbon ratchet wheel. Measure the tension of the ratchet wheel friction spring on both the left and the right ribbon feed mechanism.

c. Adjustment. Replace the left or the right ratchet wheel friction spring if it fails to meet the requirement.

336. Ribbon Lever Spring Tension Adjustment

(fig. 258)

a. Requirement. It should require 1½ to 3 ounces to start the ribbon lever moving.

b. Method of Checking. Hook an 8-ounce scale over the ribbon lever just in front of the spring and pull in line with the spring. Check the tension of both the right and left springs.

c. Adjustment. Replace the right or left ribbon lever spring if it fails to meet the requirement.

337. Ribbon Tension Spring Tension

(fig. 258)

a. Requirement. When the ribbon is removed and the ribbon ratchet wheel positioned so that the spool driving pin is to the right of the spool shaft on the right-hand unit, and to the left on the left-hand unit, it should require 3 to 5½ ounces to start the spool shaft moving.

b. Method of Checking. Hook an 8-ounce scale on the driving pin and pull toward the front of the unit. Measure the tension of the spring on both right and left units.

c. Adjustment. Replace the right or left ribbon tension spring, if it fails to meet the requirement.

338. Function Lever Spring Tension

(fig. 259)

a. Requirement. When the function levers are in their unoperated position, it should require 1½ to 2¾ ounces to start the function lever moving.

b. Method of Checking. Hook an 8-ounce scale over the function lever immediately above the function pawl. Hold the spacing suppression bail forward and pull toward the rear. Measure the tension of each function pawl spring.

Note. If a function lever operates a contact or a slide, hold off the contact or slide when checking the spring tension.

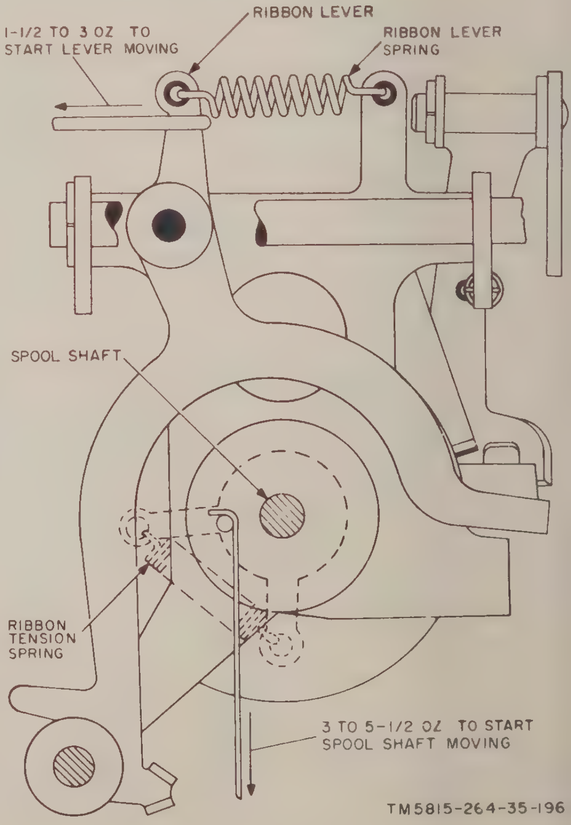


Figure 258. Ribbon reverse mechanism, top view.

c. Adjustment. Replace any function lever spring that fails to meet the requirement.

339. Function Pawl Spring Tension
(fig. 259)

a. Requirement. When the rear end of the function pawl is resting on top of the function bar extension, it should require 3 to 5 ounces to start the function pawl moving.

b. Method of Checking. Hook a 32-ounce scale on the hook at the end of the function pawl and pull in line with the pawl. Measure the tension of each function pawl spring.

c. Adjustment. Replace any function pawl spring that fails to meet the requirement.

340. Function Bar Spring Tension
(fig. 259)

a. Requirement. When the function clutch rotated until the function bail is withdrawn from the function bars, it should require 2½ to 3½ ounces to start the function bar moving.

b. Method of Checking. Hook an 8-ounce scale on the upward extension at the rear end of the function bar. Hold the function pawl away from the function bar and pull to the rear. Measure the tension of each function bar spring.

c. Adjustment. Replace any function bar spring that fails to meet the requirement.

341. Line Feed Spur Gear Detent Eccentric Adjustment
(fig. 260)

a. Requirement. With the line feed clutch disengaged, rotate the platen by means of the platen handwheel until the detent stud is seated between two teeth on the line feed spur gear. Release the handwheel and manually seat the teeth on the feed bars into engagement with the teeth on the line feed spur gear. The detent stud should contact one gear tooth and be not more than .010 inch from the other tooth.

b. Adjustment. Loosen the mounting screw on the detent eccentric. Position the detent eccentric to obtain the requirement. Keep the high part of the eccentric above the horizontal center of its mounting screw; tighten the mounting screw.

342. Platen Detent Bail Spring Tension
(fig. 260)

a. Requirement. When the detent stud is

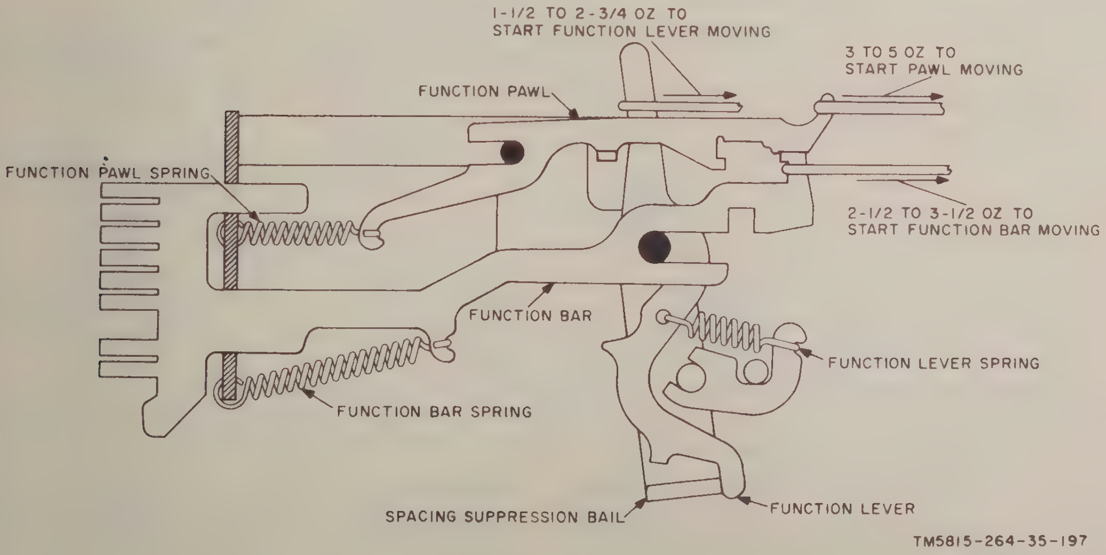

1-1/2 TO 2-3/4 OZ TO START FUNCTION LEVER MOVING
3 TO 5 OZ TO START PAWL MOVING
FUNCTION PAWL
FUNCTION PAWL SPRING
2-1/2 TO 3-1/2 OZ TO START FUNCTION BAR MOVING
FUNCTION BAR
FUNCTION LEVER SPRING
FUNCTION BAR SPRING
SPACING SUPPRESSION BAIL
FUNCTION LEVER
TM5815-264-35-197

Figure 259. Function box mechanism.

seated between two teeth on the line feed spur gear, it should require 16 to 32 ounces to start the platen detent bail moving.

b. Method of Checking. Hook a 32-ounce scale on the detent bail just to the rear of the stud and pull at a right angle to the detent bail.

c. Adjustment. Replace the platen detent bail spring if it fails to meet the requirement.

343. Line Feed Bar Release Lever Spring Tension (fig. 260)

a. Requirement. It should require 3 to 8 ounces to start the line feed bar release lever moving.

b. Method of Checking. Apply an 8-ounce push scale to the top of the release lever and push downward.

c. Adjustment. Replace the line feed bar release lever spring if it fails to meet the requirement.

344. Line Feed Bar Bell Crank Spring Tension (fig. 260)

a. Requirement. When the line feed clutch is engaged, and the main shaft until the left-hand line feed bar is in its maximum rear position, it should require 19 to 24 ounces to start the line feed bar moving.

b. Method of Checking. Hook a 32-ounce scale on the upper end of the bar and pull toward the rear.

c. Adjustment. Replace the line feed bar bell crank spring if it fails to meet the requirement.

345. Stripper Blade Drive Cam Position Adjustment (fig. 261)

a. Requirement. The stripper blade drive cam should move each stripper blade cam arm an equal distance above the center line of its pivot (A), and an equal distance below the center line of its pivot (B) as gaged by eye.

b. Method of Checking. With the function clutch disengaged, observe the overtravel of the upper peak of the stripper blade drive cam with respect to the peak on the stripper blade cam arm. Rotate the function clutch and observe the overtravel of the lower peak of the stripper blade drive cam when the clutch has turned the cam to its extreme downward position.

c. Adjustment. Loosen the two mounting screws on the stripper blade drive arm link. Insert the blade of a screwdriver in the adjusting slot and position the drive arm link to equalize the overtravel of each cam peak; tighten the mounting screws.

346. Single-Double Line Feed Stripper Bail Assembly Spring Tension (fig. 262)

a. Requirements.

(1) *Helical torsion spring.* With the line feed clutch disengaged and the single-double line feed lever in the single line feed position, it should require a pull of ½ to 2½ ounces to start the stripper bail arm (A) moving upward.

(2) *Helical extension spring.* With the line feed clutch disengaged, and the single-double line feed lever in the single line feed position, it should require ½ to 2½ ounces to start the stripper bail arm (B) moving to the left.

b. Method of Checking.

(1) Hook an 8-ounce scale under the rear of the stripper bail arm and pull upward to check requirement *a*(1) above.

(2) Hook the scale over the rear of the arm and pull toward the left to check requirement *a*(2) above.

c. Adjustment. Replace the stripper bail helical torsion spring, and/or the helical extension spring if it fails to meet the requirement.

347. Spacing Suppression Bail Spring Tension (C, fig. 262)

a. Requirement. When the suppression bail is in its rear position, it should require ½ to 1½ ounces to start the spacing suppression bail moving.

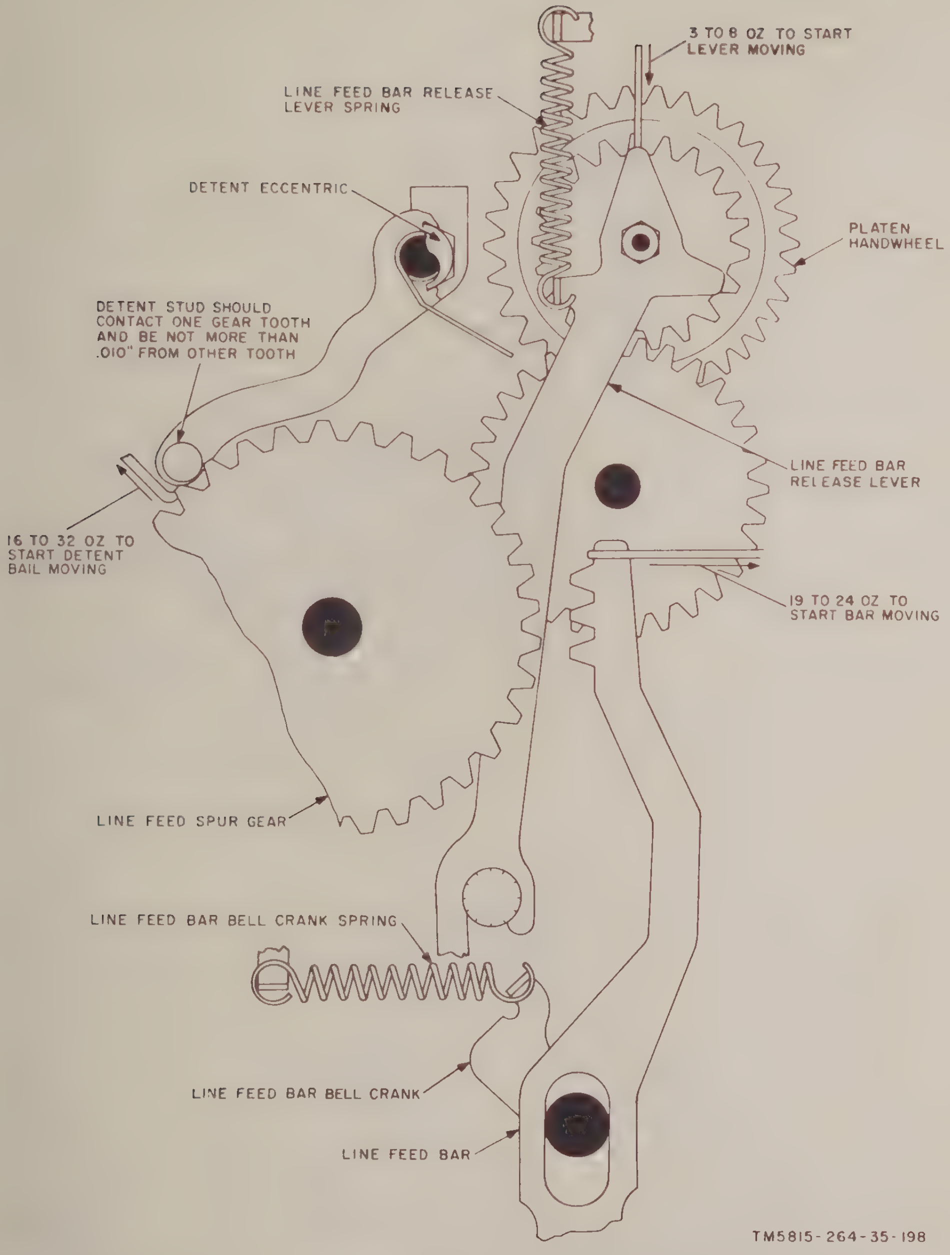

3 TO 8 OZ TO START LEVER MOVING
LINE FEED BAR RELEASE LEVER SPRING
DETENT ECCENTRIC
PLATEN HANDWHEEL
DETENT STUD SHOULD CONTACT ONE GEAR TOOTH AND BE NOT MORE THAN .010" FROM OTHER TOOTH
LINE FEED BAR RELEASE LEVER
16 TO 32 OZ TO START DETENT BAIL MOVING
19 TO 24 OZ TO START BAR MOVING
LINE FEED SPUR GEAR
LINE FEED BAR BELL CRANK SPRING
LINE FEED BAR BELL CRANK
LINE FEED BAR
TM5815-264-35-198

Figure 260. Line feed mechanism, right side view.

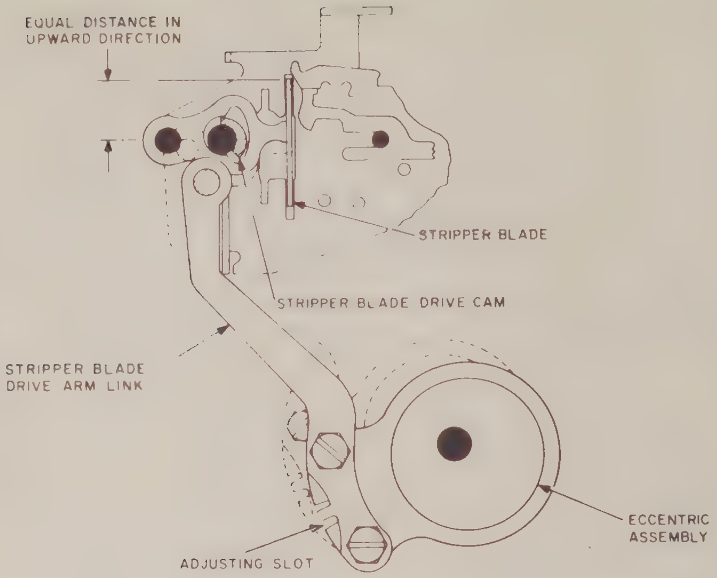
b. Method of Checking. Apply the push end of an 8-ounce scale to the rear edge, near the middle, of the bail and push forward.

c. Adjustment. Replace the left, and/or the right, suppression bail spring if it fails to meet the requirement.

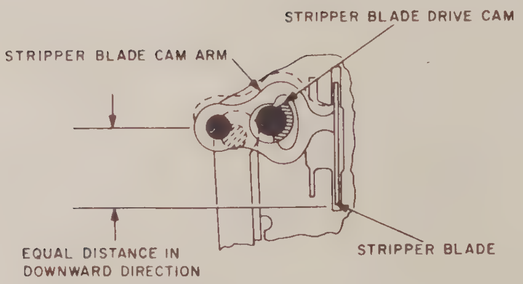
348. Paper Straightener Collar Adjustment (A, fig. 263)

a. Requirement.

(1) The left-hand paper straightener collar should be spaced $\frac{9}{32}$ to $\frac{21}{64}$ inch


EQUAL DISTANCE IN UPWARD DIRECTION
STRIPPER BLADE
STRIPPER BLADE DRIVE CAM
STRIPPER BLADE DRIVE ARM LINK
ECCENTRIC ASSEMBLY
ADJUSTING SLOT

A. LEFT VIEW


STRIPPER BLADE DRIVE CAM
STRIPPER BLADE CAM ARM
EQUAL DISTANCE IN DOWNWARD DIRECTION
STRIPPER BLADE

B. LEFT VIEW

TM5815-264-35-139

Figure 261. Function pawl stripper blade mechanism.

from the left shoulder on the paper straightener shaft.

(2) The right-hand paper straightener collar should be spaced 1/16 to 5/64 inch from the right shoulder on the paper straightener shaft.

b. Adjustment. Loosen the setscrew on the left and right paper straightener collar. Position the collars to obtain the requirements *a* (1) and (2) above; tighten the setscrews.

349. Paper Straightener Lever Spring Tension (B, fig. 263)

a. Requirement. It should require 1½ to 4 ounces to move the paper straightener lever.

b. Method of Checking. Apply the push end

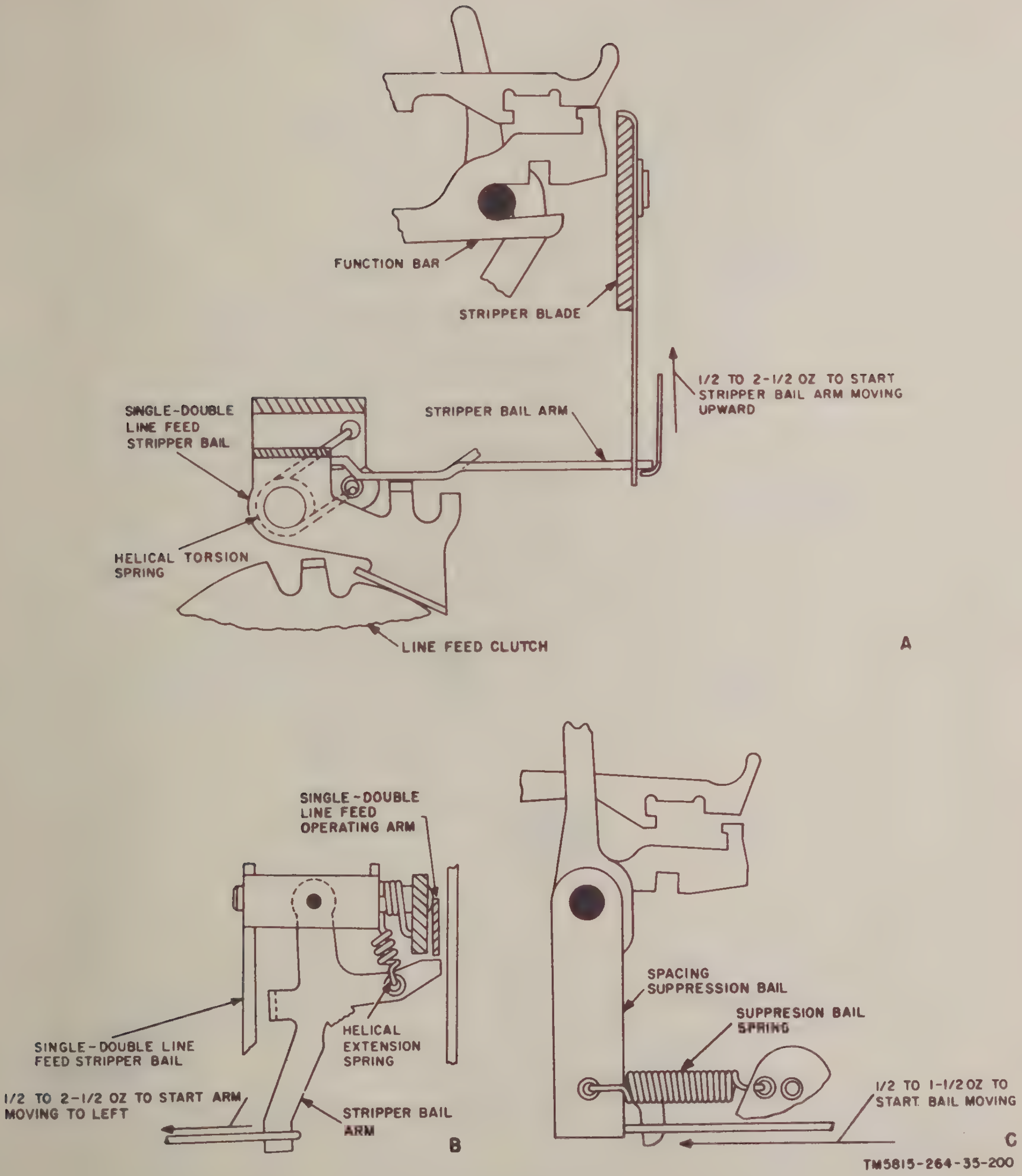
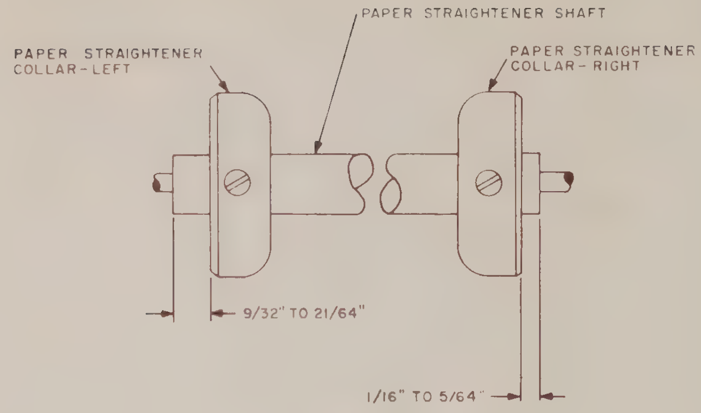
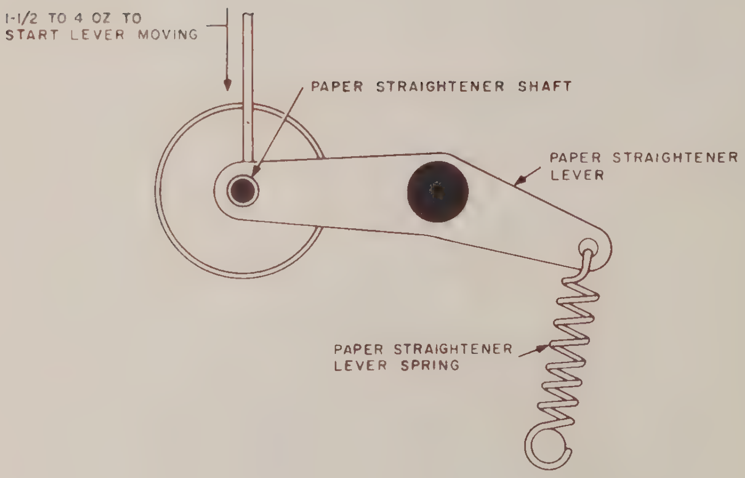

FUNCTION BAR
STRIPPER BLADE
1/2 TO 2-1/2 OZ TO START STRIPPER BAIL ARM MOVING UPWARD
SINGLE-DOUBLE LINE FEED STRIPPER BAIL
STRIPPER BAIL ARM
HELICAL TORSION SPRING
LINE FEED CLUTCH
A
SINGLE-DOUBLE LINE FEED OPERATING ARM
SINGLE-DOUBLE LINE FEED STRIPPER BAIL
HELICAL EXTENSION SPRING
1/2 TO 2-1/2 OZ TO START ARM MOVING TO LEFT
STRIPPER BAIL ARM
B
SPACING SUPPRESSION BAIL
SUPPRESION BAIL SPRING
1/2 TO 1-1/2 OZ TO START BAIL MOVING
C
TM5815-264-35-200

Figure 262. Single-double line feed and spacing suppression mechanisms.


PAPER STRAIGHTENER SHAFT
PAPER STRAIGHTENER COLLAR-LEFT
PAPER STRAIGHTENER COLLAR-RIGHT
9/32" TO 21/64"
1/16" TO 5/64"

A. FRONT VIEW


1-1/2 TO 4 OZ TO START LEVER MOVING
PAPER STRAIGHTENER SHAFT
PAPER STRAIGHTENER LEVER
PAPER STRAIGHTENER LEVER SPRING

B SIDE VIEW

TM5815-264-35-201

Figure 263. Paper mechanism.

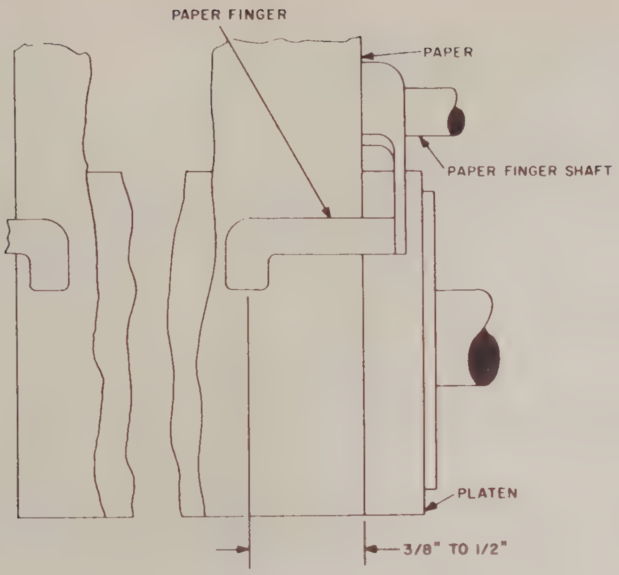
of an 8-ounce scale to the upper edge of the lever directly above the paper straightener shaft and push downward. Measure both the left and right lever springs.

c. Adjustment. Replace the left and/or the right lever spring if it fails to meet the requirement.

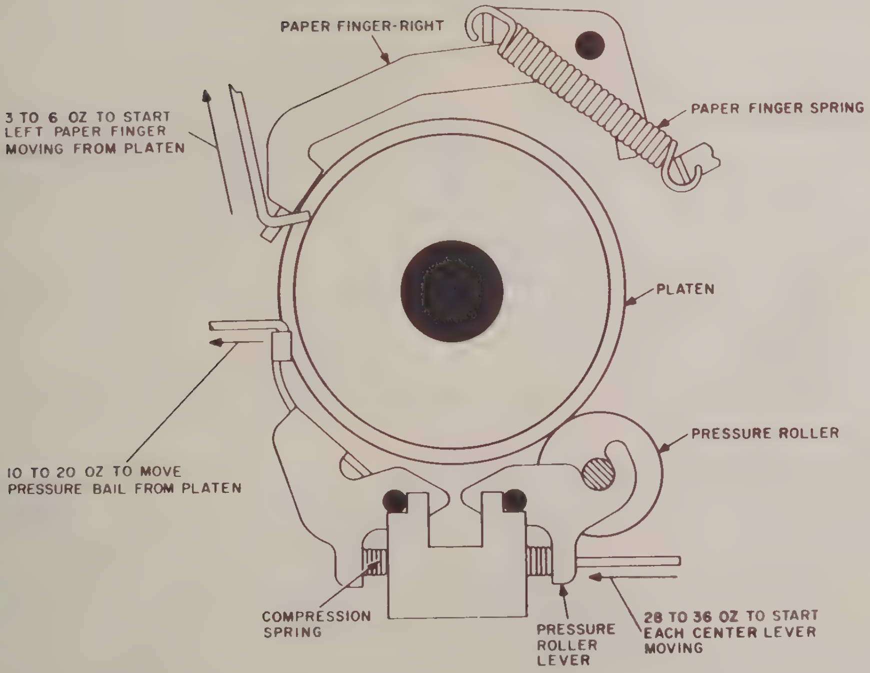
350. Paper Finger Adjustment
(A, fig. 264)

a. Requirement. The pressure end of the paper fingers should overlap the paper from 3/8 to 1/2 inch.

b. Adjustment. Position the paper fingers by sliding them on the paper finger shaft to obtain the requirement.


PAPER FINGER
PAPER
PAPER FINGER SHAFT
PLATEN
3/8" TO 1/2"

A. FRONT VIEW


PAPER FINGER-RIGHT
PAPER FINGER SPRING
3 TO 6 OZ TO START LEFT PAPER FINGER MOVING FROM PLATEN
PLATEN
PRESSURE ROLLER
10 TO 20 OZ TO MOVE PRESSURE BAIL FROM PLATEN
COMPRESSION SPRING
PRESSURE ROLLER LEVER
28 TO 36 OZ TO START EACH CENTER LEVER MOVING

B. END VIEW

TM5815-264-35-209

Figure 264. Paper mechanism.

351. Paper Finger Spring Tension
(B, fig. 264)

a. Requirement. It should require 3 to 6 ounces to start the left paper finger moving.

b. Method of Checking. Hook an 8-ounce scale under the front horizontal edge of the right paper finger and pull upward.

c. Adjustment. Replace the paper finger spring if it fails to meet the requirement.

352. Paper Pressure Bail Spring Tension
(B, fig. 264)

a. Requirement. When the pressure bail is resting against the platen, it should require 10 to 20 ounces to move the pressure bail away from the platen.

b. Method of Checking. Hook a 32-ounce scale over the upper edge of the pressure bail, near the right end of the platen, and pull forward. Check the tension at the left end of the platen in a similar manner.

c. Adjustment. Replace the left and/or right compression spring if it fails to meet the requirement.

353. Pressure Roller Lever Spring Tension
(B, fig. 264)

a. Requirement. It should reqire 28 to 36 ounces to start each pressure roller lever moving.

b. Method of Checking. Apply a 64-ounce push scale to the lower end of the pressure roller lever and push approximately in line with the spring. Measure the tension of both lever springs.

c. Adjustment. Replace either pressure roller lever spring if it fails to meet the requirement.

354. Function Switch Contact Plate Adjustment
(fig. 265)

Note. In order to check the adjustment, it is necessary to remove the function box from the typing unit. Therefore it should not be checked unless there is good reason to believe that it is causing operating failure.

a. Requirements.

(1) There should be not less than .008-inch clearance between the formed-over end of the front contact clip (A) and the bottom of the contact arm when the rear contact is closed.

(2) There should be at least .006-inch clearance between the contact arm (B) and the vertical portion of the front and the rear contact clip.

b. Method of Checking. Remove the function box as described in paragraph 102*a*. Do not remove the function switches as described in paragraph 102*a*(9) and (10).

(1) With the function lever in its rear (operated) position (A), check the clearance specified in requirements *a*(1) above with a feeler gage.

(2) At the front contact clip, take up the play between the contact arm and the contact clip to make the clearance a minimum. Measure the clearance specified in requirements *a*(2) with a feeler gage. Check the clearance at the rear contact clips in the same manner.

c. Adjustments.

(1) Replace the function switch contact plate if it fails to meet requirements *a*(1) above.

(2) Loosen the two mounting screws on the function switch. Position the contact plate to obtain requirements *a*(2) above; tighten the mounting screws. Replace the function box as described in paragraph 104*d*.

355. Function Switch Contact Spring Tension
(A, fig. 265)

a. Requirement. When the switch contact arm is in its closed position, it should require a pull of 1 to 2 ounces to open the switch contact.

b. Method of Checking. Hook an 8-ounce scale under the contact arm adjacent to the contact arm insulator and pull up. Check the tension of all contact springs.

c. Adjustment. Replace any contact spring that fails to meet the requirement.

356. Code Bar Detent Adjustment

a. Requirement. The No. 4 code bar and the letters-figures shift code bar (A, fig. 266) should detent approximately equal when gaged by eye.

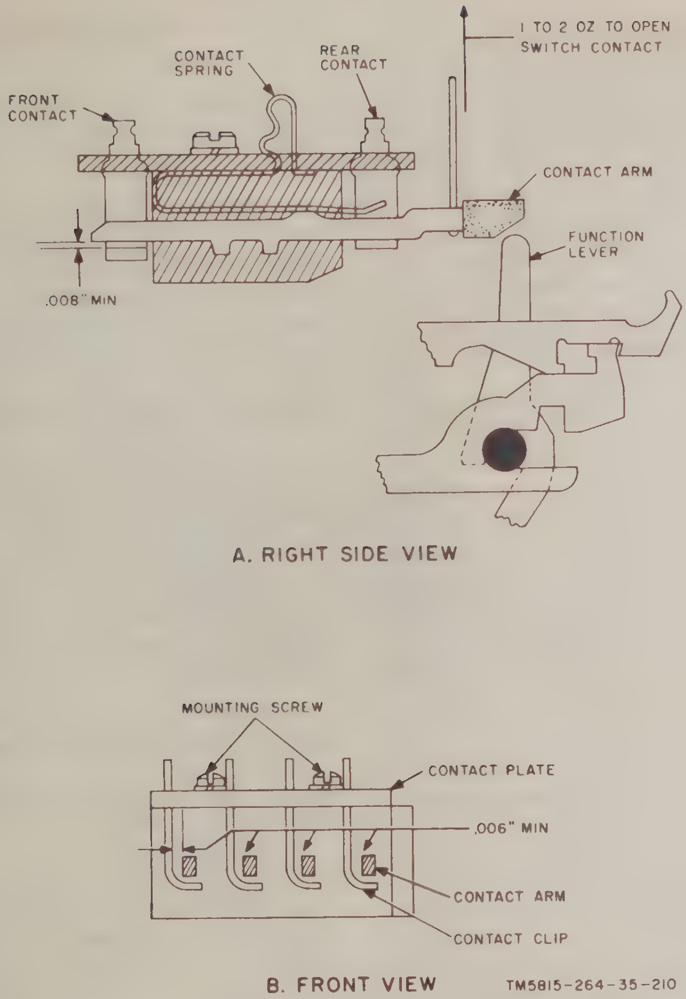

1 TO 2 OZ TO OPEN SWITCH CONTACT
CONTACT SPRING
REAR CONTACT
FRONT CONTACT
CONTACT ARM
FUNCTION LEVER
.008" MIN
A. RIGHT SIDE VIEW
MOUNTING SCREW
CONTACT PLATE
.006" MIN
CONTACT ARM
CONTACT CLIP
B. FRONT VIEW
TM5815-264-35-210

Figure 265. Function switch mechanism.

b. Method of Checking. Remove the front plate mechanism as described in paragraph 101*a*. With all clutches fully disengaged, alternately shift the No. 4 and letters-figures shift code bars from the marking to the spacing position and observe the detenting action of each code bar.

c. Adjustment. Loosen the mounting screws on the code bar detent bracket. Equalize the detenting of the code bars by adding or removing shims between the detent bracket and the code bar guide bracket; tighten the mounting screws. Replace the front plate mechanism (par. 101*d*).

357. Code Bar Detent Spring Tension (A, fig. 266)

Note. Unless there is reason to believe that the detent springs are causing operating failure, do not check this requirement.

a. Requirement. With the code bar detent bracket removed, it should require 1½ to 3½ ounces to start the detent ball moving against the compression of its spring.

b. Method of Checking.

(1) Remove the code bar detent bracket as follows:

(*a*) Remove the print suppression solenoid spring (A, fig. 268).

(*b*) Carefully loosen two screws on the blocking bail (B, fig. 268) until the forward extension of the bail can be moved out of the notch in the suppression code bar.

Caution: **Loss or damage to the detent balls and detent ball compression springs may result if the bracket mounting screws are fully removed.**

(*c*) Remove the upper and lower mounting screws on the code bar detent bracket.

(*d*) Carefully remove the detent bracket from the code bar guide bracket.

Caution: **When removing the detent bracket assembly from the code bar guide bracket, maintain the correct number of shims at the upper and lower mounting screws.**

(2) Apply the pull end of an 8-ounce scale to the detent ball (A, fig. 266). Pull in line with the ball travel. Measure each detent ball.

(3) Replace the detent bracket by reversing the removal procedure described in *b*(1) above.

c. Adjustment. Replace any compression spring that fails to meet the requirement.

358. Code Bar Yield Spring Tension
(B, fig. 266)

a. Requirement. When the selector clutch, code bar clutch, and type box clutch are disengaged, and the No. 1, 2, and common code bars moved to the spacing position (left), it should require 17 to 23 ounces to start the code bar shift bar pivot moving away from the code bar.

b. Method of Checking. Hook a 32-ounce scale to the front shoulder of the number one code bar shift bar and pull to the right. Check the No. 2 and common code bars, and associated code bar shift bars in the same manner.

c. Adjustment. Replace any code bar yield spring that fails to meet the requirement.

359. End-of-line Indicator Lamp Adjustment
(A, fig. 267)

a. Requirement. Operating under power, the end-of-line indicator lamp should light on the desired character.

b. Adjustment. Set the type box to print the desired character, loosen the three mounting screws on the end-of-line indicator cam disk. Position the cam disk on the spring drum so that the end-of-line indicator switch just opens; tighten the mounting screws.

360. End-of-line Indicator Spring Tension
(B, fig. 267)

a. Requirement. It should require 7 to 11 ounces to start the end-of-line indicator contact switch lever moving.

b. Method of Checking. Hook a 32-ounce scale under the contact switch lever, at the right of the end-of-line indicator switch, and pull upward.

c. Adjustment. Replace the end-of-line indicator spring if it fails to meet the requirement.

361. Type Box Clutch Suppression Arm Adjustment
(A, fig. 268)

a. Requirements. When the suppression arm on the type box clutch is in the blocking position and the main shaft rotated until the function clutch shoe lever is opposite the function clutch trip lever, the following requirements should be met:

(1) There should be at least .003-inch clearance between the clutch trip arm extension and the type box clutch trip lever.

(2) There should be at least .006-inch clearance between the function clutch shoe lever and the function clutch trip lever.

b. Method of Checking. Measure the specified clearances in requirements *a*(1) and (2) above with a feeler gage.

c. Adjustment. Loosen the mounting screws on the suppression arm. Position the sup-

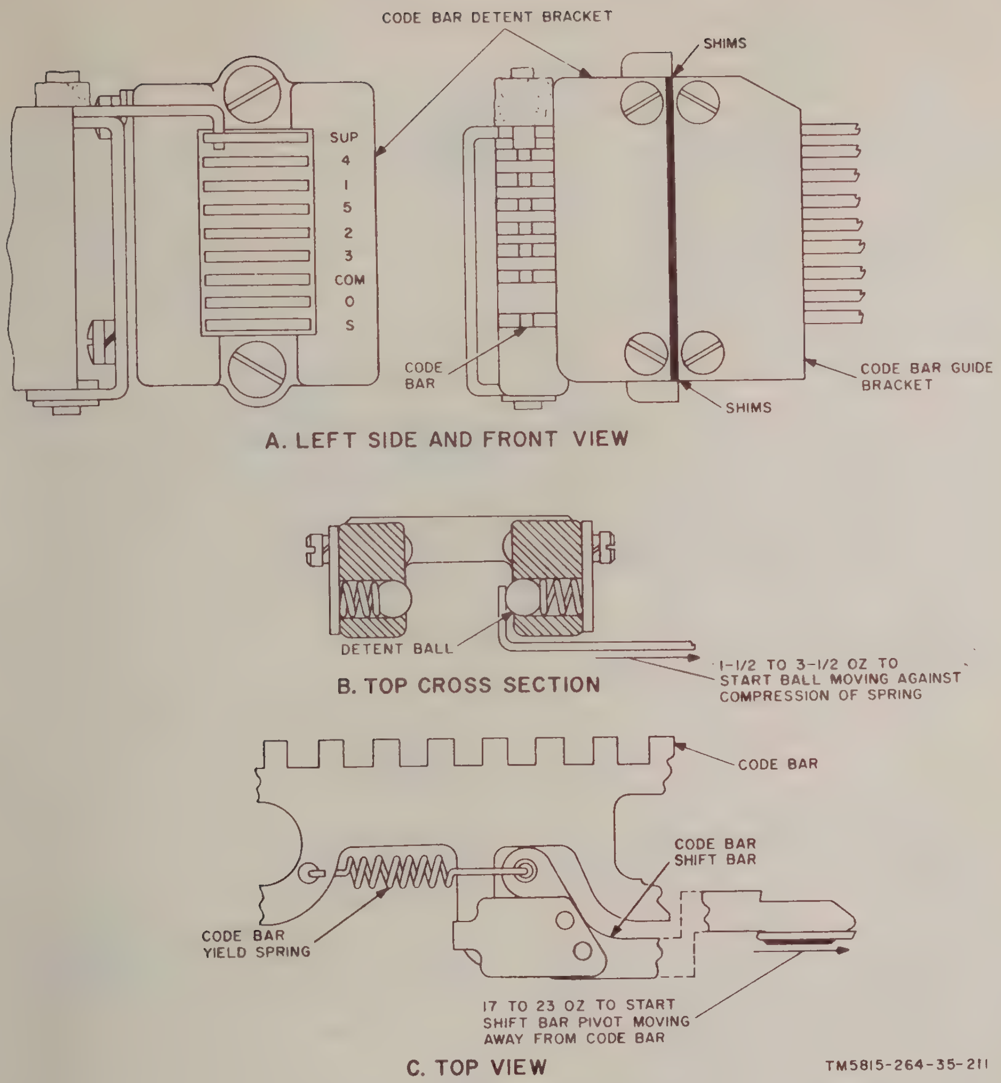

CODE BAR DETENT BRACKET
SHIMS
SUP
4
1
5
2
3
COM
0
S
CODE BAR
CODE BAR GUIDE BRACKET
SHIMS
A. LEFT SIDE AND FRONT VIEW
DETENT BALL
B. TOP CROSS SECTION
1-1/2 TO 3-1/2 OZ TO START BALL MOVING AGAINST COMPRESSION OF SPRING
CODE BAR
CODE BAR SHIFT BAR
CODE BAR YIELD SPRING
17 TO 23 OZ TO START SHIFT BAR PIVOT MOVING AWAY FROM CODE BAR
C. TOP VIEW
TM5815-264-35-211

Figure 266. Code bar detent mechanism.

pression arm to obtain requirements *a*(1) and (2) above; tighten the mounting screws.

362. Blocking Bail Adjustment
(A, fig. 268)

a. Requirement. There should be .008- to .035-inch clearance between the suppression arm and the blocking bail extension when play in the blocking bail is taken up to make the clearance a minimum.

b. Method of Checking. Rotate the main shaft until the lower surface of the suppression arm is approximately aligned with the bottom surface of the blocking bail extension. Measure the clearance with a round wire gage.

c. Adjustment. Loosen the mounting screw on the blocking bail extension. Position the extension to obtain the requirement; tighten the mounting screws.

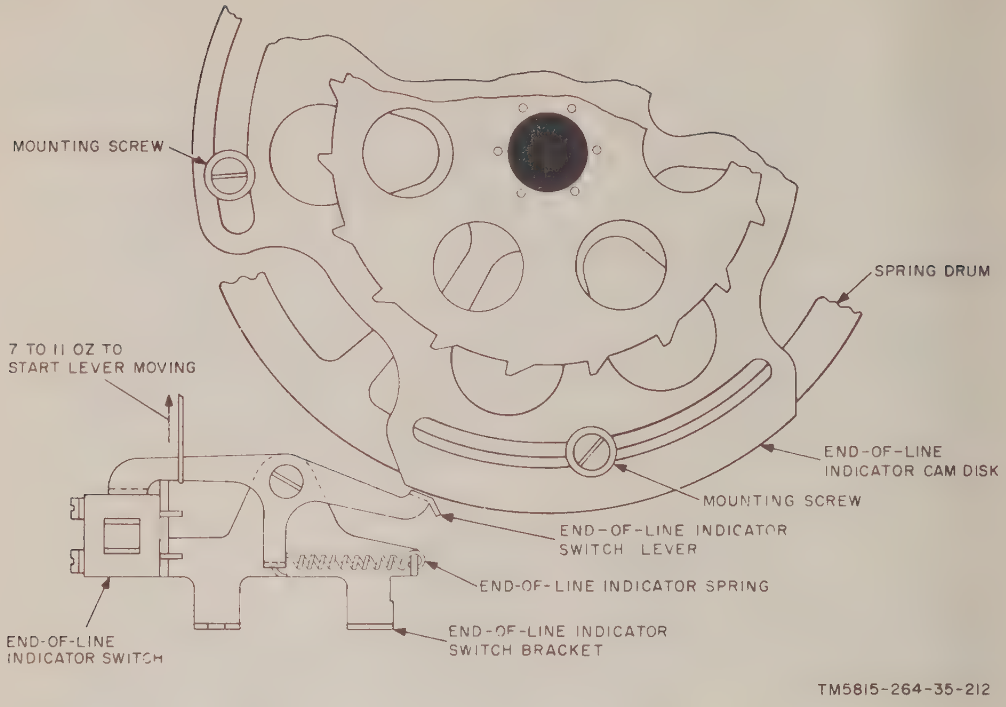

MOUNTING SCREW
SPRING DRUM
7 TO 11 OZ TO START LEVER MOVING
END-OF-LINE INDICATOR CAM DISK
MOUNTING SCREW
END-OF-LINE INDICATOR SWITCH LEVER
END-OF-LINE INDICATOR SPRING
END-OF-LINE INDICATOR SWITCH
END-OF-LINE INDICATOR SWITCH BRACKET
TM5815-264-35-212

Figure 267. End-of-line indicator mechanism.

363. Print Suppression Solenoid L1 Bracket Adjustment

(C, fig. 268)

a. Requirement. When the print suppression solenoid L1 is energized and all code bars are shifted to the right, the notch in the suppression code bar should align with the notches in the other code bars.

b. Method of Checking. With the function clutch fully disengaged, move all the code bars to the marking position (right) and check the requirement as gaged by eye.

c. Adjustment. Loosen three mounting screws on the print suppression solenoid bracket. Position the bracket to obtain the requirement; tighten the mounting screws.

364. Print Suppression Solenoid Spring Tension

(A, fig. 268)

a. Requirement. With the print suppression solenoid deenergized, it should require 2 to 4½ ounces to pull the solenoid spring to its installed length.

b. Method of Checking. Unhook the solenoid spring from the spring post on the solenoid. Hook an 8-ounce scale in the spring loop and pull to installed length; replace the spring.

c. Adjustment. Replace the solenoid spring if it fails to meet the requirement.

365. Suppression Code Bar Spring Tension

(B, fig. 268)

a. Requirement. When the print suppression solenoid is deenergized and the type box clutch is disengaged, it should require 4½ to 7½ ounces to start the suppression code bar moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the end of the suppression code bar and push to the right.

c. Adjustment. Replace the suppression code bar spring if it fails to meet the requirement.

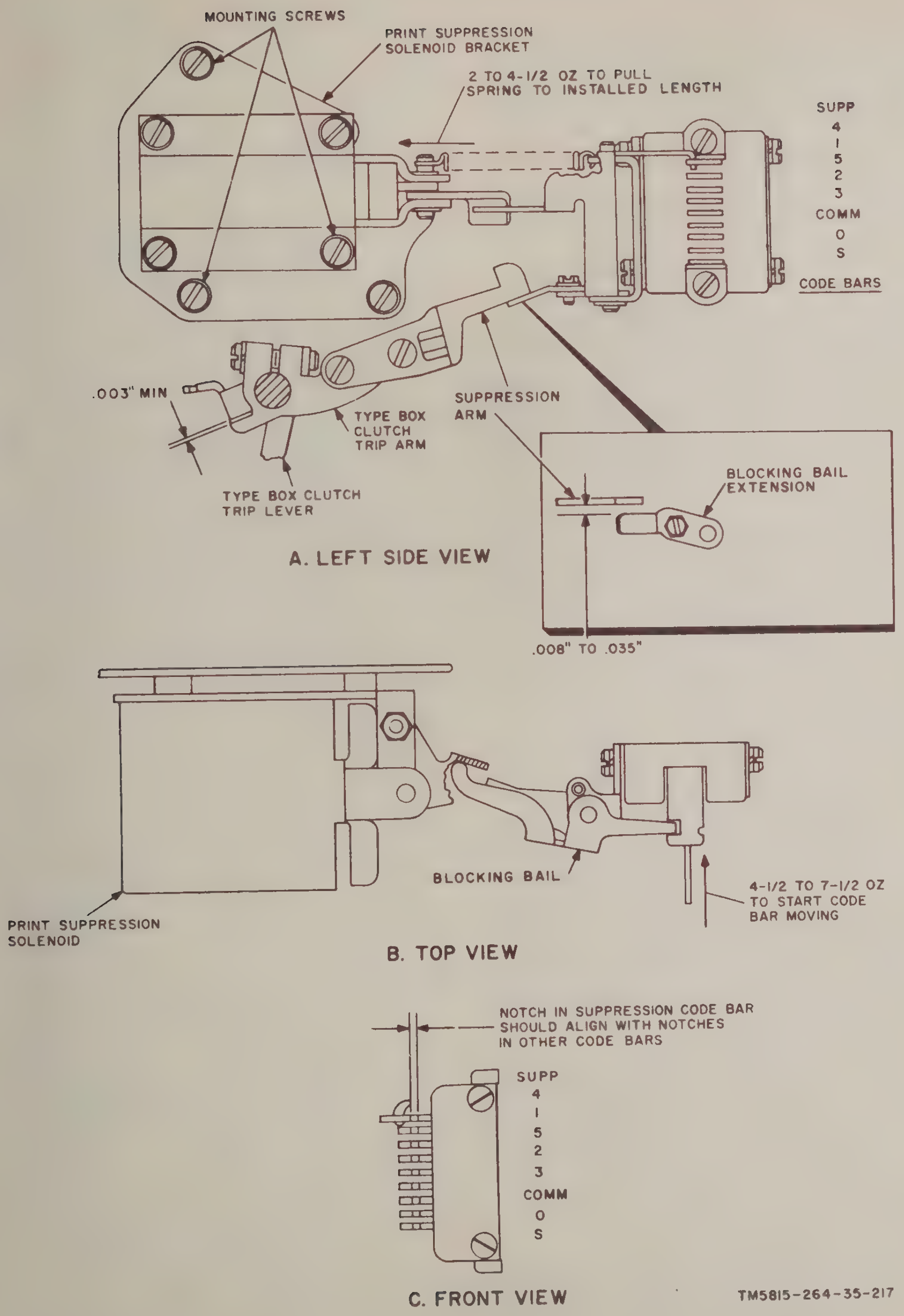

MOUNTING SCREWS
PRINT SUPPRESSION SOLENOID BRACKET
2 TO 4-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH
SUPP
4
1
5
2
3
COMM
0
S
CODE BARS
.003" MIN
TYPE BOX CLUTCH TRIP ARM
SUPPRESSION ARM
TYPE BOX CLUTCH TRIP LEVER
BLOCKING BAIL EXTENSION
A. LEFT SIDE VIEW
.008" TO .035"
BLOCKING BAIL
4-1/2 TO 7-1/2 OZ TO START CODE BAR MOVING
PRINT SUPPRESSION SOLENOID
B. TOP VIEW
NOTCH IN SUPPRESSION CODE BAR SHOULD ALIGN WITH NOTCHES IN OTHER CODE BARS
SUPP
4
1
5
2
3
COMM
0
S
C. FRONT VIEW
TM5815-264-35-217

Figure 268. Print suppression solenoid and suppression code bar mechanism.

Section XVIII. ADJUSTMENT OF MOTOR UNITS

366. General

This section contains the requirements, test procedures, and adjustments for the main motor unit B1, and reperforator motor unit B2.

367. Main Motor Unit

a. Removal. Remove the motor unit B1 as described in paragraph 80*a*.

b. Motor Start Relay K3 Adjustment.

(1) *Requirement.* The motor unit B1 should start immediately in a counterclockwise direction, looking at the fan end, on a minimum of 103 volts, ac, at 60 cycles under normal operating conditions. The current flow through the running winding should not be more than 2.7 amperes.

(2) *Method of Checking.* Connect a suitable ac ammeter in series with either power lead. Energize the motor unit. Observe its starting action and check the meter indication.

(3) *Adjustment.* Replace the motor start relay K3, if it fails to meet the requirement.

c. Thermal Overload Switch S11 Adjustment.

(1) *Requirement.* With 115 volts, ac, 60 cycles applied to motor unit B1 and with the armature blocked (motor fan rigidly secured to prevent motor shaft rotation), the thermal overload switch S11 should open in not less than 3 seconds and not more than 15 seconds the first time. With the power off and the armature free to rotate, reset the manual button.

Note. It should be possible to reset the overload switch within 5 minutes.

(2) *Adjustment.* Replace the thermal overload switch if it fails to meet the requirement.

d. Motor Fan Adjustment.

(1) *Requirements.*

(*a*) When the motor unit is energized, the motor fan should not wobble.

(*b*) The motor fan should not be eccentric by more than .030 inch, when measured at its outer edge.

(2) *Adjustment.* Replace the motor fan if it fails to meet the requirements *a*(1) or (2) above.

e. Motor Unit Vibration Adjustment.

(1) *Requirement.* When the motor unit operated under power at approximately 3600 rpm while resting on a bench, vibration should not cause the motor unit to creep across the bench, and the motor should operate with a minimum of noise.

(2) *Adjustment.* Replace the motor unit if it fails to meet the requirement.

f. Motor Thrust Spring Tension.

(1) *Requirement.* It should require a pressure of at least 7 pounds to start the motor shaft moving.

(2) *Method of Checking.* Apply the push end of a 12-pound scale to the end of the motor shaft opposite the fan, and push parallel to the shaft.

(3) *Adjustment.* Replace the motor thrust spring if it fails to meet the requirement.

g. Replacement. Replace the motor unit B1 as described in paragraph 80*b*.

368. Reperforator Motor Unit

a. Removal. Remove the motor unit B2 as described in paragraph 87*a*.

b. Motor Start Relay K4 Adjustment.

(1) *Requirement.* Motor unit B2 should start immediately in a counterclockwise direction, looking at the fan end, on a minimum of 103 volts, ac, at 60 cycles under normal operating conditions. The current flow through the running winding should not be more than 2 amperes.

(2) *Method of Checking.* Connect a suitable ac ammeter in series with either power lead. Energize the motor unit. Observe its starting action and check the meter indication.

(3) *Adjustment.* Replace the motor start relay if it fails to meet the requirement.

c. Common Adjustments. Except for the requirement described in *b* above, the adjustment requirements for the main motor unit and the reperforator motor unit are the same. Perform the adjustments described in paragraph 367*c* through *f* to complete the adjustment of the reperforator motor unit.

d. Replacement. Replace the motor unit B2 as described in paragraph 87*b*.

Section XIX. ADJUSTMENT OF PERFORATOR UNIT

369. General

This section contains the requirements and adjustment procedures for the perforator unit. Adjustments are arranged in the proper sequence for a complete readjustment of the unit. When making an individual adjustment also check all related adjustments. When it is necessary to remove parts or assemblies in order to make an adjustment, reference is made to specific paragraphs for removal and replacement instructions.

a. Removal. Remove the perforator unit as described in paragraph 81*a*.

b. Replacement. Replace the perforator unit as described in paragraph 81*b*.

c. Keyboard Control Switch. K (keyboard), K–T (keyboard & tape), and T (tape) refer to corresponding positions of the keyboard control knob. Unless otherwise specified, all adjustments will be made with the keyboard control knob in the K–T position.

d. Manual Operation of Perforator Unit. To manually operate the perforator unit when it is removed from the keyboard base, proceed as follows:

(1) Rotate the main shaft counterclockwise to bring the function clutch to its partially disengaged (stop) position. The clutch does not fully disengage upon reaching its stop position. To relieve the drag on the clutch and permit the mainshaft to rotate freely, apply pressure on the stop lug of the clutch cam disk (fig. 269), with a screwdriver to cause it to engage its latch lever (fig. 271) and thus fully disengage the internal expansion clutch.

(2) Trip the clutch by pivoting the main trip lever (fig. 308) counterclockwise.

(3) Unlatch the punch slides (A, fig. 274) corresponding to the marking elements of the code combination to be processed, starting with the rear (number one) punch slide.

(4) Continue to rotate the main shaft counterclockwise until the required condition is set up or the code combination is processed through the unit.

370. Function Clutch Shoe Lever Adjustment (fig. 269)

a. Requirement. The gap between the clutch shoe lever and its stop lug should be .055- to .085-inch greater when the function clutch is engaged than when the clutch is disengaged.

b. Method of Checking.

(1) Disengage the function clutch.

(2) Measure the gap between the clutch shoe lever and stop lug with a round wire gage and note gap.

(3) Trip the clutch and rotate the main shaft until the clutch shoe lever is toward the bottom of the unit.

(4) Align the head of the clutch drum mounting screw with the stop lug.

(5) Manually compress the clutch shoe lever against the stop lug and allow them to snap apart.

(6) Measure the gap with the clutch thus engaged, and compare it with the clearance noted in (2) above.

c. Adjustment.

(1) Adjust the function clutch shoe lever as follows:

  (*a*) Loosen the two clamp screws on the clutch cam disk.

  (*b*) Engage a wrench or screwdriver on the stop lug of the clutch cam disk and rotate the disk to obtain the requirement.

  (*c*) Tighten the clamp screws.

(2) Check the clutch drum for drag as follows:

  (*a*) Disengage the function clutch.

  (*b*) Remove the clutch drum mounting screw and lockwasher.

  (*c*) Rotate the clutch drum in its normal direction of rotation and make certain that it does not drag on the internal clutch shoes.

  (*d*) Replace the clutch drum mounting screw and lockwasher.

  (*e*) If the clutch drum drags, repeat (1) (*a*) through (*c*) above and refine the adjustment towards the maximum clearance.

371. Function Clutch Drum End Play Adjustment (fig. 269)

a. Requirement. With the function clutch disengaged there should be .001- to .010-inch clearance between the function cam sleeve and the collar when play is taken up to make the clearance a maximum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the collar mounting screw. Position the collar to obtain the requirement; tighten the mounting screw.

372. Clutch Shoe Lever Spring Tension (A, fig. 230)

a. Requirement. With the function clutch engaged and the clutch cam disk held to prevent turning, it should require a pull of 15 to 20 ounces to move the clutch shoe lever in contact with the stop lug.

b. Method of Checking. Hook a 32-ounce spring over the clutch shoe lever and pull tangent to the clutch.

c. Adjustment. Replace the clutch shoe spring if it fails to meet the requirement.

373. Clutch Shoe Spring Tension (B, fig. 230)

Note. In order to check the spring tension, it is necessary to remove the function clutch from the main shaft. Therefore, it should not be checked unless it does not meet the requirement.

a. Requirement. It should require 3 to 5 ounces to start the primary shoe moving away from the secondary shoe at point of contact.

b. Method of Checking. Remove the mainshaft and function clutch as described in paragraph 136*a*. With the clutch removed, hook an 8-ounce scale over the primary shoe and pull at a tangent to the friction surface.

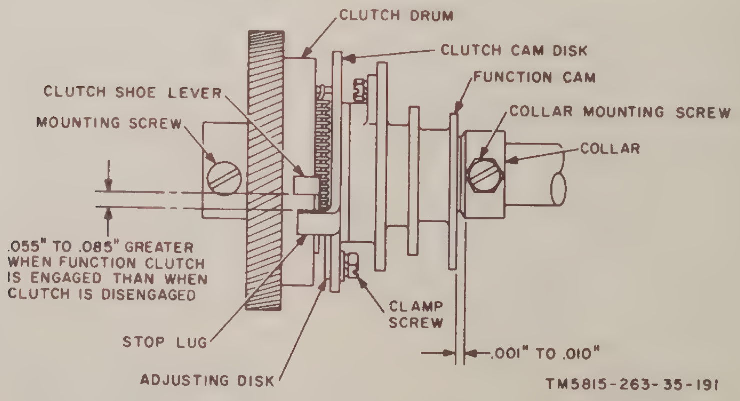

CLUTCH DRUM
CLUTCH CAM DISK
FUNCTION CAM
CLUTCH SHOE LEVER
COLLAR MOUNTING SCREW
MOUNTING SCREW
COLLAR
.055" TO .085" GREATER WHEN FUNCTION CLUTCH IS ENGAGED THAN WHEN CLUTCH IS DISENGAGED
CLAMP SCREW
STOP LUG
.001" TO .010"
ADJUSTING DISK
TM5815-263-35-191

Figure 269. Function clutch, right side view.

c. Adjustment. Replace the clutch shoe spring if it fails to meet the requirement. Replace the function clutch and main shaft as described in paragraph 136*d*.

374. Rocker Bail Adjustment
(A, fig. 270)

a. Requirement. With the rocker bail positioned to its extreme left and the upper roller in contact with the function cam, there should be .001- to .003-inch clearance between the function cam and lower roller at the point of least clearance.

b. Method of Checking. Measure the clearance given in *a* above with a flat feeler gage.

c. Adjustment. Loosen the locknut on the lower roller mounting screw. Position the lower roller mounting screw in the elongated slot to obtain the requirement; tighten the locknut. Rotate the main shaft through one revolution and check for binds between the function cam and lower roller. Check the related adjustments given in paragraphs 383, 388, 415, 433, 392, and 375.

375. Rocker Bail Guide Bracket Adjustment

a. Requirement.

(1) The rocker bail rollers should engage the full thickness of their respective function cams (B, fig. 270).

(2) The lifter arm roller should be in full engagement with the rocker bail camming surface (A, fig. 291).

b. Adjustment. Loosen the two mounting screws on the guide bracket. Visually align the rocker bail, either left or right, until the requirement given in *a*(1) and (2) above are obtained; tighten the mounting screws.

376. Function Clutch Trip Lever Adjustment
(fig. 271)

a. Requirements.

(1) With the clutch release (C) resting on the main trip lever, the trip lever (A) should engage the full thickness of the clutch shoe lever.

(2) There should be .001- to .006-inch clearance between the shoulder on the shaft (B) and the trip lever, when play is taken up to make the clearance a maximum.

b. Adjustment. Loosen the clamp screw on the trip lever (A). Position the trip lever, on its shaft (B), to obtain requirements *a*(1) and (2) above; tighten the clamp screw. Check the related adjustment given in paragraph 377.

377. Reset Arm Adjustment
(fig. 271)

a. Requirements.

(1) With the function clutch engaged and the main shaft rotated until the reset arm (C) is in its uppermost position, there should be .010- to .030-inch clearance between the clutch release and the main trip lever.

(2) There should be .001- to .010-inch clearance between the latch lever (B) and trip lever when play is taken up to make the clearance a maximum.

b. Adjustment. Loosen the clamp screw (C) on the reset arm. Position the reset arm, on its shaft, to obtain requirements *a*(1) and (2) above; tighten the clamp screw.

378. Main Trip Lever Spring Tension
(fig. 272)

a. Requirement. With the clutch release tripped, it should require 1½ to 3 ounces to pull the main trip lever away from the clutch release.

b. Method of Checking. Hook an 8-ounce scale under the main trip lever, near the top, and pull toward the left.

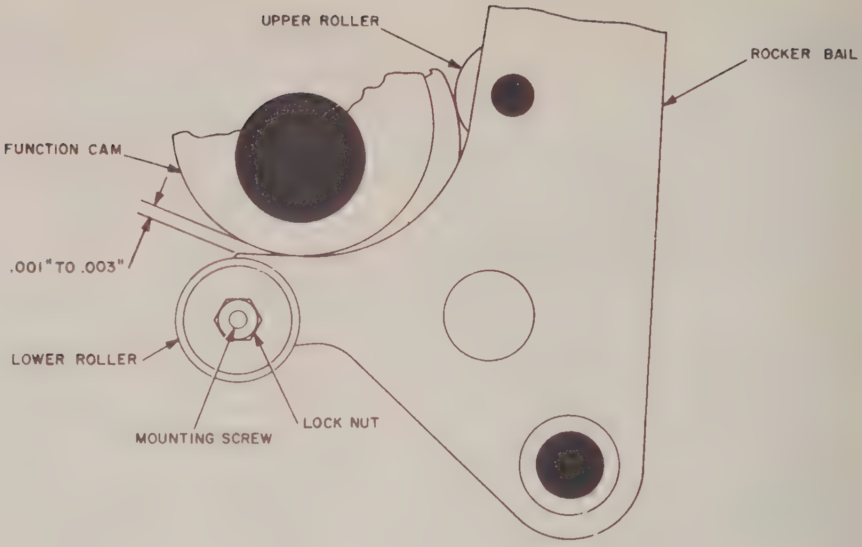
c. Adjustment. Replace the main trip lever spring if it fails to meet the requirement.

379. Clutch Trip Bar Link Return Spring

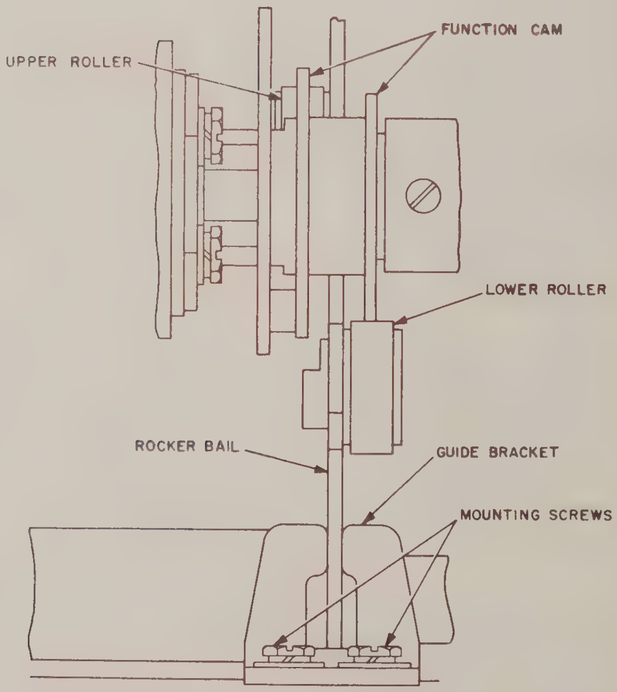
a. Requirement. With the keyboard control knob in the K–T position and the function clutch disengaged, it should require 3 to 4 ounces to start the trip lever latch moving (fig. 272).

b. Method of Checking. Apply the push end of an 8-ounce scale to the left end of the trip lever latch and push toward the right.

c. Adjustment. Replace the clutch trip bar link return spring (fig. 308) if it fails to meet the requirement.


UPPER ROLLER
ROCKER BAIL
FUNCTION CAM
.001" TO .003"
LOWER ROLLER
LOCK NUT
MOUNTING SCREW

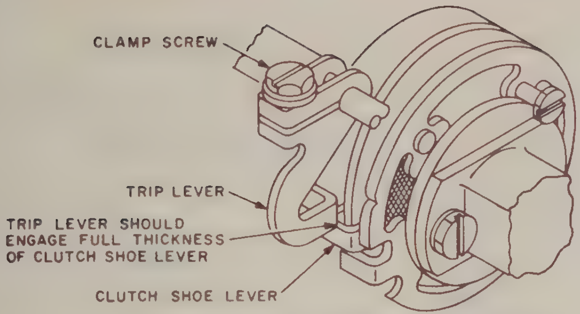
A. REAR VIEW


FUNCTION CAM
UPPER ROLLER
LOWER ROLLER
ROCKER BAIL
GUIDE BRACKET
MOUNTING SCREWS

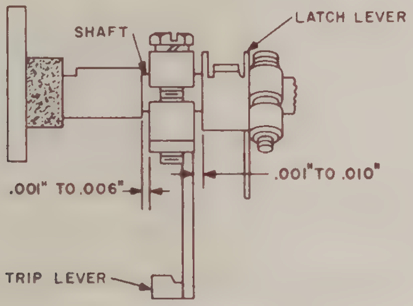
B. RIGHT SIDE VIEW

TM5815-263-35-192

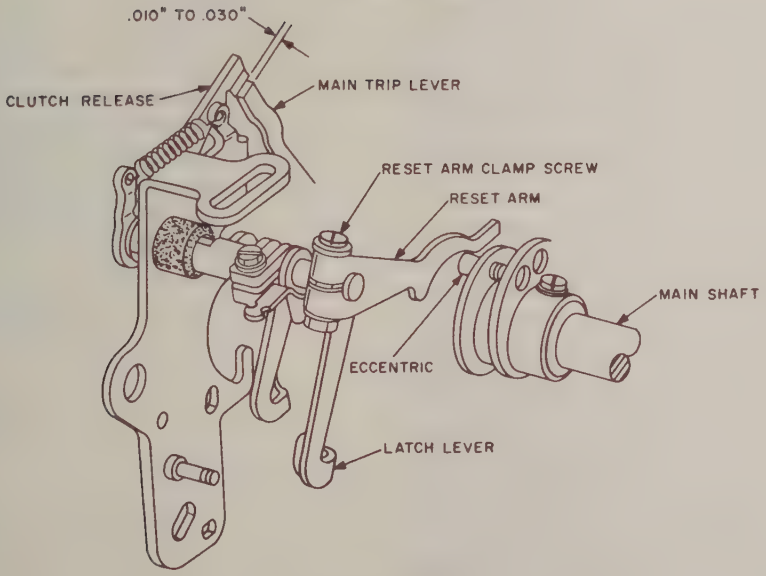
Figure 270. Function mechanism.


CLAMP SCREW
TRIP LEVER
TRIP LEVER SHOULD ENGAGE FULL THICKNESS OF CLUTCH SHOE LEVER
CLUTCH SHOE LEVER

A. RIGHT SIDE VIEW


SHAFT
LATCH LEVER
.001" TO .006"
.001" TO .010"
TRIP LEVER

B. RIGHT SIDE VIEW


.010" TO .030"
CLUTCH RELEASE
MAIN TRIP LEVER
RESET ARM CLAMP SCREW
RESET ARM
MAIN SHAFT
ECCENTRIC
LATCH LEVER

C. RIGHT SIDE VIEW

TM5815-263-35-193

Figure 271. Function mechanism.

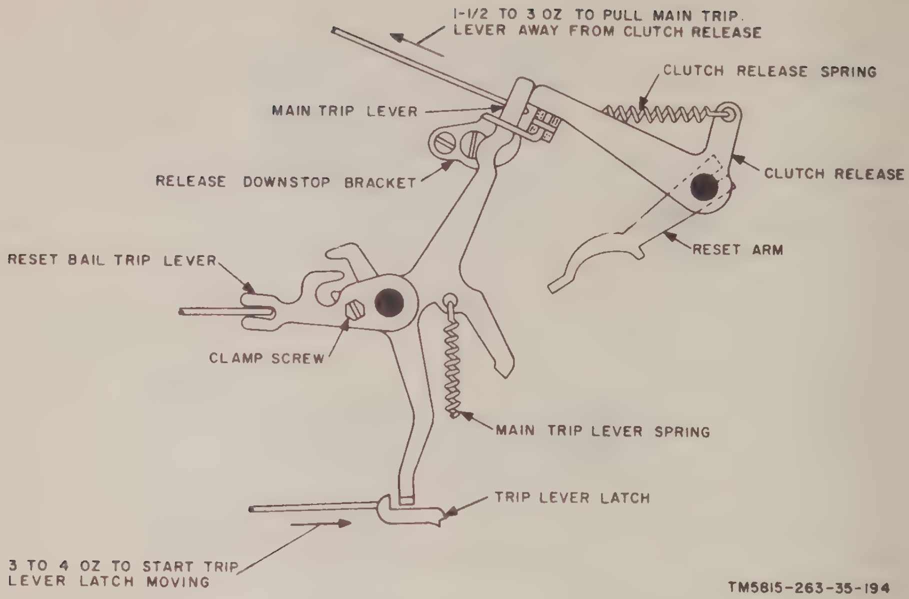

1-1/2 TO 3 OZ TO PULL MAIN TRIP LEVER AWAY FROM CLUTCH RELEASE
CLUTCH RELEASE SPRING
MAIN TRIP LEVER
CLUTCH RELEASE
RELEASE DOWNSTOP BRACKET
RESET ARM
RESET BAIL TRIP LEVER
CLAMP SCREW
MAIN TRIP LEVER SPRING
TRIP LEVER LATCH
3 TO 4 OZ TO START TRIP LEVER LATCH MOVING
TM5815-263-35-194

Figure 272. Perforator trip lever mechanism, front view.

380. Punch Position Adjustment (Preliminary)

a. Requirement. When the punch mounting screws (A, fig. 273) are centrally located in their elongated mounting holes, the punch slide latches (A, fig. 274) should be visually horizontal when engaged with the punch slides (A, fig. 273).

b. Adjustment. Remove the lower punch mounting screw. Loosen the upper punch mounting screw, the adjusting clamp pivot screw, and the anchor bracket mounting screw to friction tightness. With the punch slides in the reset condition, position the punch mechanism to obtain the requirement. Tighten the upper punch mounting screw and the adjusting clamp pivot screw; recheck the requirement. Replace and tighten the lower punch mounting screw. With the perforator unit resting on a flat level surface, press down on the base of the anchor bracket until it contacts the level surface then tighten the bracket mounting screw.

381. Rocker Arm Adjustment

Note. Before proceeding with the following adjustments, check the rocker bail adjustment (par. 374).

a. Requirements.

(1) When the rocker bail upper roller (A, fig. 270) is on the high part of the function cam, there should be .002- to .005-inch clearance between the lower edge of the feed pawl stud and the upper edge of the 159926 gage (A, fig. 273) when play between the stud and gage are taken up to make the clearance a minimum.

(2) There should be not less than .022-inch end play in the rocker arm shaft (C, fig. 273).

(3) There should be .001- to .015-inch clearance between the rocker arm and bearing hub.

Note. After the feed pawl adjustment (par. 388) has been made, if the punch pin penetration adjustment (par. 384) and feed pawl adjustment (par. 388) requirements are met, the requirement given in (1) through (3) above should be considered fulfilled.

b. Method of Checking. Trip the function clutch and rotate the mainshaft until the rocker bail upper roller (A, fig. 270) is on the high part of the function cam. Position the 159926 gage (A, fig. 273) so that the pin end engages the hole in the front plate and the left end is resting on the bearing hub of the toggle bail eccentric shaft. With play taken up to make the clearance a minimum, measure the clearances given in *a*(1) through (3) above with flat feeler and round wire gages.

c. Adjustment.

(1) Select the blank code combination and trip the function clutch.

(2) Remove the two mounting nuts and lockwashers which secure the punch slide guide (A, fig. 273).

(3) Loosen the two downstop studs.

(4) Rotate the main shaft until the rocker bail upper roller (A, fig. 270) is on the high part of its cam.

(5) Loosen the clamp screw (C, fig. 273) on the rocker arm.

(6) Position the rocker arm to obtain the requirements given in *a*(1) through (3) above; tighten the clamp screw.

(7) Position the downstop plate in its lowest most position and tighten the downstop studs.

(8) Replace the punch slide guide and mounting nuts and lockwashers. With the mounting nuts fingertight, position the guide within its elongated holes so each slide is aligned with its corresponding punch pin (B, fig. 274); tighten the mounting nuts. Check the related adjustments given in paragraphs 388, 384, 383, 387, and 385.

382. Drive Link Spring Tension
(B, fig. 273)

a. Requirement. It should require 3½ to 8 ounces to pull the drive link spring to its installed length.

b. Method of Checking. Unhook the spring from the lower end of the rocker arm. Hook an 8-ounce scale in the spring and pull to installed length.

c. Adjustment. Replace the drive link spring if it fails to meet the requirement.

383. Punch Slide Downstop Position Adjustment
(fig. 274)

a. Requirement. With the function clutch disengaged, there should be .001- to .008-inch clearance between each punch slide (A) and the downstop plate when play at the left end of the punch slide is taken up to make the clearance a maximum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Remove the two mounting nuts (B) and lockwashers which secure the punch slide guide; remove the guide. Loosen the downstop mounting studs (A) and position the downstop plate to obtain the requirement; tighten the mounting studs. Replace the punch slide guide, lockwashers and mounting nuts. Position the guide so that the punch slides align with the punch pins (B) as gaged by eye; tighten the mounting nuts. Check the related adjustment given in paragraph 385.

384. Punch Pin Penetration
(fig. 274)

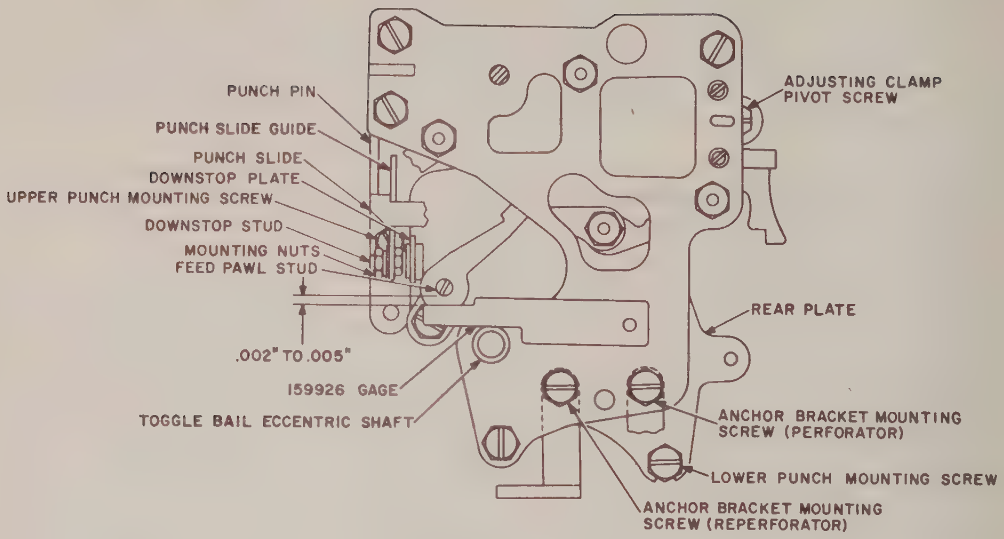
a. Requirement. With the letters code combination selected, the function clutch engaged, and the main shaft rotated until the punch pins (B) have traveled the maximum distance into the die plate, there should be .060- to .070-inch clearance between the lower edge of the retractor bail and upper side of the guide plate.

b. Method of Checking. Measure the clearance with a round wire gage at the left side of the punch pins where the clearance is the least.

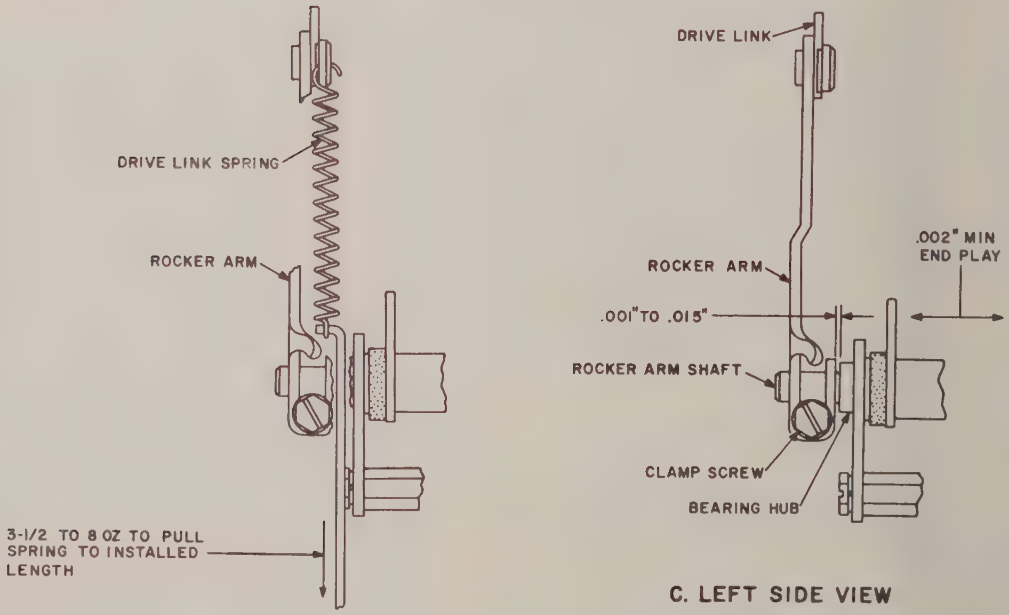
c. Adjustment. Loosen the locknut (A) on the toggle bail eccentric shaft. Rotate the eccentric shaft to obtain the requirement. Keep the indentation in the eccentric shaft to the left of a vertical centerline through the shaft; tighten the lock nut. Check the related adjustment given in paragraph 383.

385. Punch Slide Guide Position
(B, fig. 274)

a. Requirement. With the letters code combination selected, the function clutch engaged, and the main shaft rotated until the punch slides just touch the punch pins, the punch


PUNCH PIN
PUNCH SLIDE GUIDE
PUNCH SLIDE
DOWNSTOP PLATE
UPPER PUNCH MOUNTING SCREW
DOWNSTOP STUD
MOUNTING NUTS
FEED PAWL STUD
.002" TO .005"
159926 GAGE
TOGGLE BAIL ECCENTRIC SHAFT
ADJUSTING CLAMP PIVOT SCREW
REAR PLATE
ANCHOR BRACKET MOUNTING SCREW (PERFORATOR)
LOWER PUNCH MOUNTING SCREW
ANCHOR BRACKET MOUNTING SCREW (REPERFORATOR)

A. FRONT VIEW

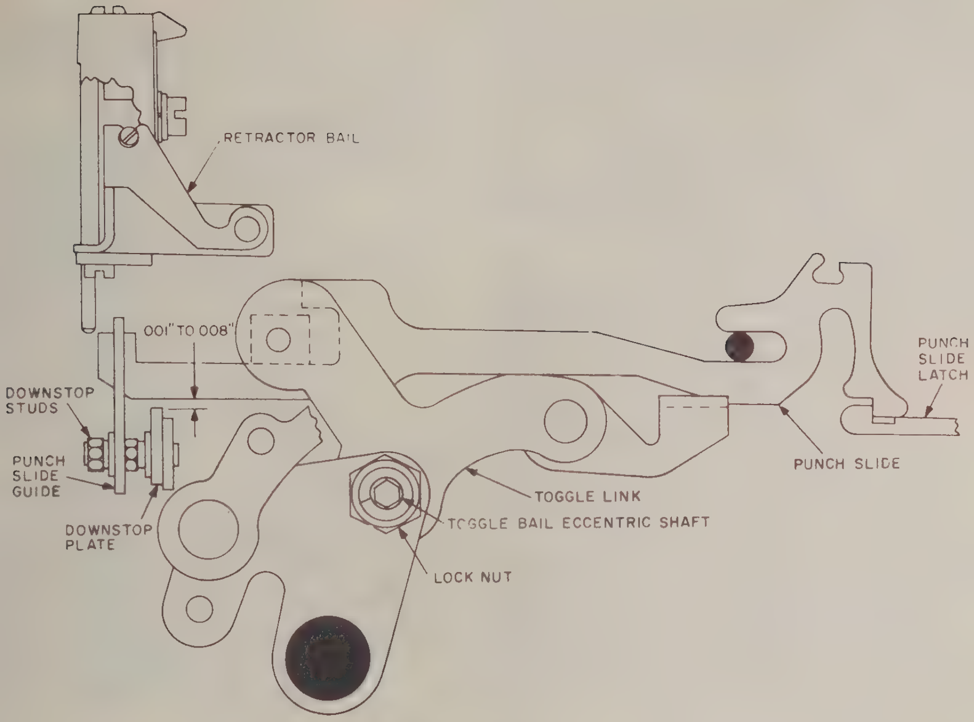

DRIVE LINK SPRING
ROCKER ARM
3-1/2 TO 8 OZ TO PULL SPRING TO INSTALLED LENGTH
DRIVE LINK
ROCKER ARM
.002" MIN END PLAY
.001" TO .015"
ROCKER ARM SHAFT
CLAMP SCREW
BEARING HUB

B. LEFT SIDE VIEW

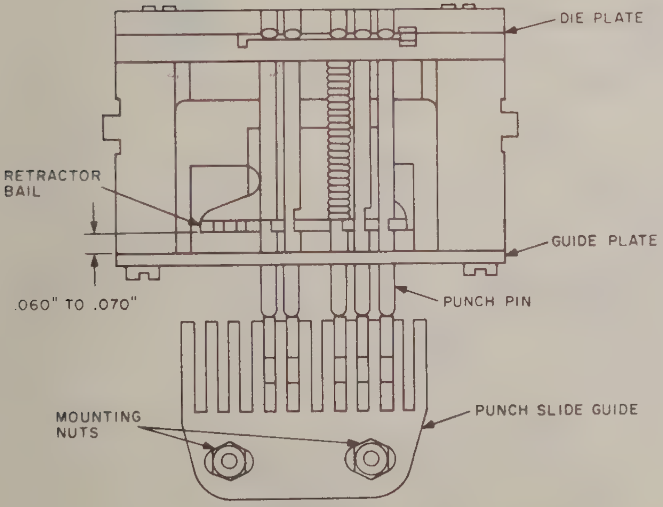
C. LEFT SIDE VIEW

TM5815-263-35-195

Figure 273. Punch mechanism.


RETRACTOR BAIL
.001" TO .008"
DOWNSTOP STUDS
PUNCH SLIDE GUIDE
DOWNSTOP PLATE
PUNCH SLIDE LATCH
PUNCH SLIDE
TOGGLE LINK
TOGGLE BAIL ECCENTRIC SHAFT
LOCK NUT

A. FRONT VIEW


DIE PLATE
RETRACTOR BAIL
GUIDE PLATE
.060" TO .070"
PUNCH PIN
PUNCH SLIDE GUIDE
MOUNTING NUTS

B. LEFT SIDE VIEW

TM5815-263-35-196

Figure 274.. Punch mechanism.

slides should align centrally with their respective pins as gaged by eye.

b. Adjustment. Loosen the mounting nuts on the punch slide guide. Position the guide to obtain the requirement; tighten the mounting nuts.

386. Punch Position Adjustment (Final)

Note. The perforator unit and the typing unit must be mounted on the keyboard base in order to check the requirement given in *a*(1) below.

a. Requirements.

(1) With the power off; letters code combination selected (par. 237*c*(1)–(5)) and the main shaft rotated until the function clutch (on the perforator unit) just trips, there should be .020- to .030-inch clearance between the punch slide latch (fig. 275) and the punch slide where the clearance is the least.

(2) With the letter V code combination selected and the main shaft rotated until the rocker bail (fig. 270) is moved to its extreme left, there should be .075- to .095-inch clearance between the punch block stripper plate (fig. 275) and the typewheel character M.

b. Method of Checking. Measure the clearances specified in requirements *a*(1) and (2) above with round wire gages.

c. Adjustments.

(1) Loosen the upper and lower punch mounting screws, the adjusting clamp lock screw, the adjusting clamp pivot screw, and the anchor bracket screw until friction tight. Place the tip of a screwdriver blade between the screw and rim of the pry hole and pry the punch up or down to obtain the requirement given in *a*(1) above; tighten the adjusting clamp lock screw only.

(2) Remove the ribbon from the carrier (fig. 301). Loosen the upper and lower punch mounting screw (fig. 275), the adjusting clamp pivot screw, and the anchor bracket screw. Position the entire punch unit to obtain the requirement described in *a*(2) above; tighten the mounting

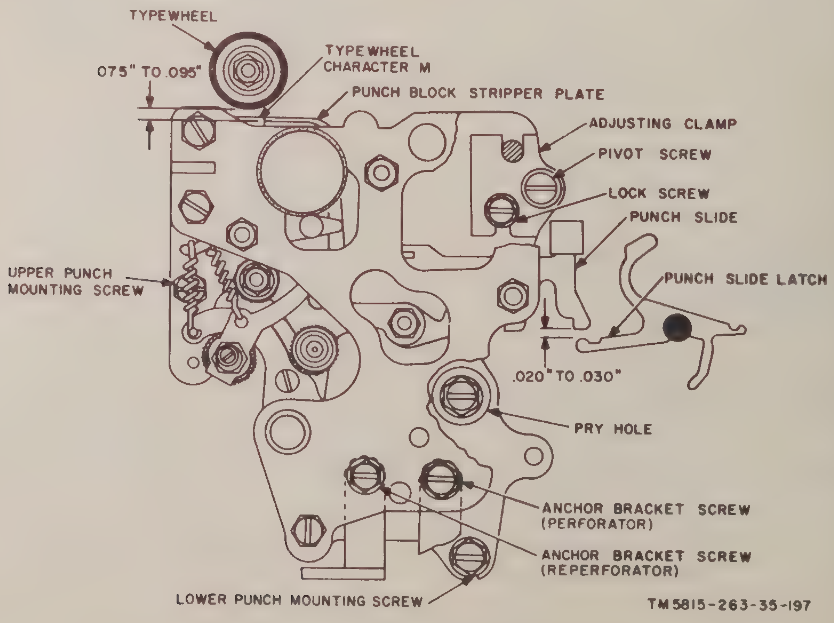

TYPEWHEEL
TYPEWHEEL CHARACTER M
.075" TO .095"
PUNCH BLOCK STRIPPER PLATE
ADJUSTING CLAMP
PIVOT SCREW
LOCK SCREW
PUNCH SLIDE
UPPER PUNCH MOUNTING SCREW
PUNCH SLIDE LATCH
.020" TO .030"
PRY HOLE
ANCHOR BRACKET SCREW (PERFORATOR)
ANCHOR BRACKET SCREW (REPERFORATOR)
LOWER PUNCH MOUNTING SCREW
TM 5815-263-35-197

Figure 275. Punch mechanism, front view.

screws. Check the related adjustments given in paragraphs 401 and 383.

387. Punch Slide Reset Bail Adjustment (A, fig. 276)

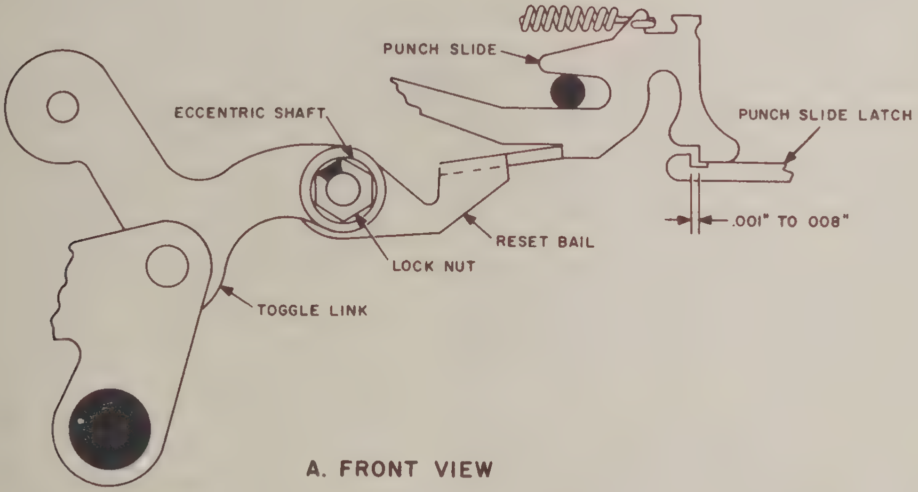
a. Requirement. With the function clutch disengaged, there should be .001- to .008-inch clearance between the punch slide latch closest to the punch slide.

b. Method of Checking. Measure the clearance specified in the requirement with round wire gage.

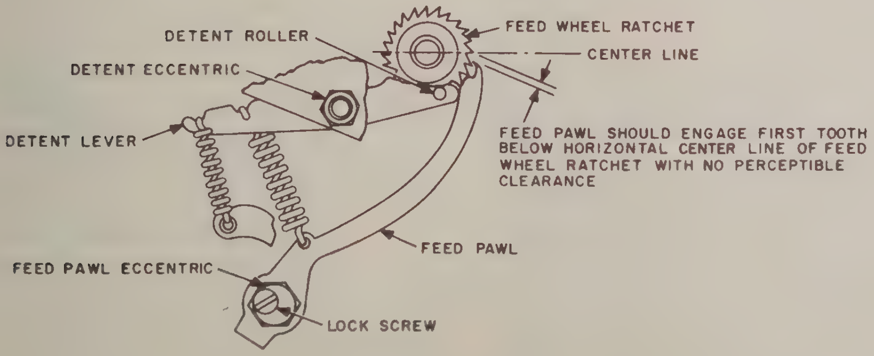
c. Adjustment. Loosen the locknut on the eccentric shaft. Rotate the eccentric shaft to obtain the requirement. Keep the indentation in the eccentric shaft high and to a vertical centerline through the shaft; tighten the lock nut. Check the related adjustment given in paragraph 448.

388. Feed Pawl Adjustment
(B, fig. 276)

Note. This adjustment and the feed hole spacing adjustment (par. 389) are related adjustments and should be made at the same time.


PUNCH SLIDE
ECCENTRIC SHAFT
PUNCH SLIDE LATCH
.001" TO 008"
RESET BAIL
LOCK NUT
TOGGLE LINK

A. FRONT VIEW


DETENT ROLLER
FEED WHEEL RATCHET
CENTER LINE
DETENT ECCENTRIC
DETENT LEVER
FEED PAWL SHOULD ENGAGE FIRST TOOTH BELOW HORIZONTAL CENTER LINE OF FEED WHEEL RATCHET WITH NO PERCEPTIBLE CLEARANCE
FEED PAWL
FEED PAWL ECCENTRIC
LOCK SCREW

B. FRONT VIEW

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Figure 276. Punch unit reset and feeding mechanism.

a. Requirement. With the function clutch disengaged; the indentation in the detent eccentric at a right angle to the detent lever; the detent roller in contact with the feed wheel ratchet and the high part of feed pawl eccentric to the right of its lock screw, the feed pawl should engage the first tooth below a horizontal centerline through the feed wheel ratchet with no preceptible clearance.

b. Adjustment. Loosen the lock screw on the feed pawl eccentric. Rotate the eccentric to obtain the requirement; tighten the lock screw. Check the related adjustment given in paragraph 391.

389. Feed Hole Spacing Adjustment (Preliminary)

(A, fig. 277)

a. Requirement. When the indent in the die wheel eccentric stud is pointing downward, there should be .002- to .004-inch clearance between the feed wheel and die wheel.

b. Method of Checking. Measure the clearance specified in the requirement with a flat feeler gage.

c. Adjustment. Loosen the locknut on the eccentric stud. Rotate the stud to obtain the requirement. Keep the indent in the eccentric stud below a horizontal centerline of the stud; tighten the locknut.

390. Feed Hole Spacing Adjustment (Final)

Note. Before proceeding with the following adjustment check both tape guide spring tensions (pars. 395 and 396). Mount the perforator on the base (par. 81*b*) and perform the adjustment given in paragraph 509.

a. Requirements.

(1) With the tape removed, there should be not less than .002-inch clearance between the feed wheel (A, fig. 277) and the die wheel.

(2) The second through fifth hole in the tape gage (B, fig. 277) should be visible through the No. 2 code holes in a sample tape perforated with six series of nine blank code combinations followed by one letters combination. The circular portion of the sixth No. 2 code hole should be within the corresponding (.086 inch) hole in the tape gage.

(3) With the tape shoe (A, fig. 283) held away from the feed wheel; the feed pawl and detent roller (B, fig. 276) disengaged and the tape removed, the feed wheel should rotate freely.

b. Method of Checking.

(1) Measure the clearance specified in *a*(1) above with a flat feeler gage.

(2) Perforate on tape six series of nine blank code combinations followed by one letters combination. Open the chads so that the code holes are visible. Place the tape on the smooth side of the tape gage so that the circular portion of the first No. 2 code hole in the tape is concentric with the first (.072 inch) hole in the tape gage.

Note. The first five holes in the gage are the same size as the holes in the tape (.072 inch diameter). The sixth hole in the gage is larger (.086 inch diameter). This arrangement allows a .007 inch variation (plus or minus) in 5 inches. Check the second through fifth; and the sixth hole in the tape for conformance with the requirement given in *a*(2) above.

(3) Rotate the feed wheel through three or four revolutions to check the requirement given in *a*(3) above.

c. Adjustments.

(1) Loosen the locknut on the eccentric stud. Rotate the stud to obtain the requirement given in *a*(1) above. Keep the indent on the eccentric stud below a horizontal centerline of the stud; tighten the locknut.

(2) Repeat the procedure given in *b*(2) above. Refine the adjustment given in (1) above, if necessary. To decrease the feed hole spacing rotate the eccentric stud toward the feed wheel; and away from the feed wheel to increase feed hole spacing.

***Caution:* With the tape removed, make certain that the feed wheel-die wheel clearance is not less than .002 inch.**

(3) Recheck the requirement given in *a*(1) above. Refine the adjustment given in (1) above, if necessary.

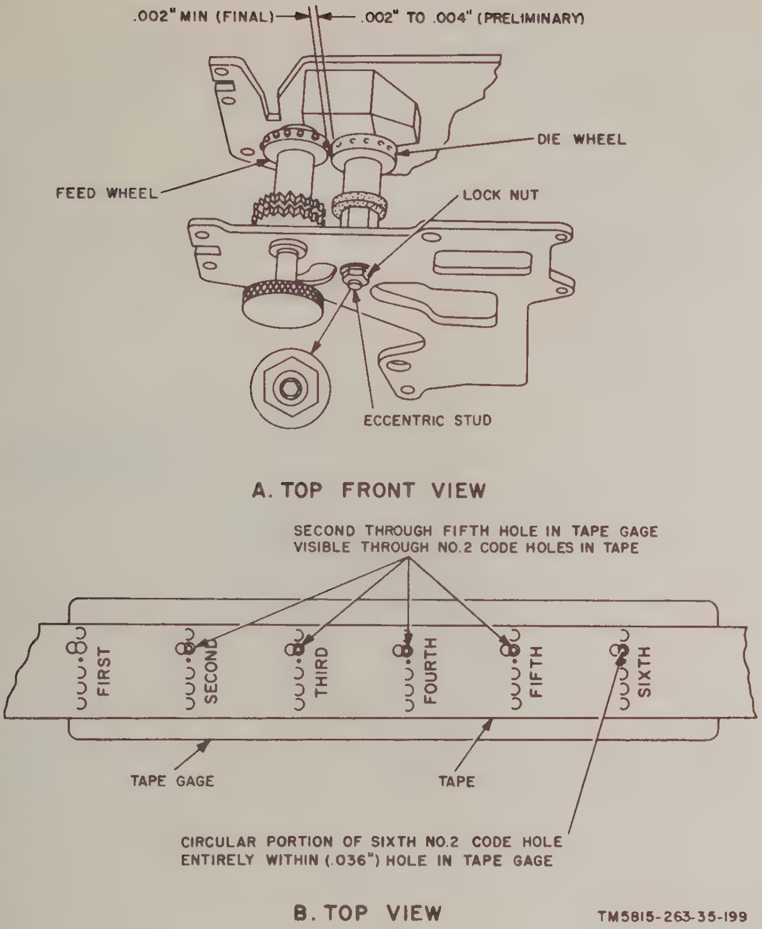

.002" MIN (FINAL)
.002" TO .004" (PRELIMINARY)
DIE WHEEL
FEED WHEEL
LOCK NUT
ECCENTRIC STUD
A. TOP FRONT VIEW
SECOND THROUGH FIFTH HOLE IN TAPE GAGE VISIBLE THROUGH NO.2 CODE HOLES IN TAPE
FIRST
SECOND
THIRD
FOURTH
FIFTH
SIXTH
TAPE GAGE
TAPE
CIRCULAR PORTION OF SIXTH NO.2 CODE HOLE ENTIRELY WITHIN (.036") HOLE IN TAPE GAGE
B. TOP VIEW
TM5815-263-35-199

Figure 277. Tape feed mechanism.

391. Detent Lever Adjustment (fig. 278)

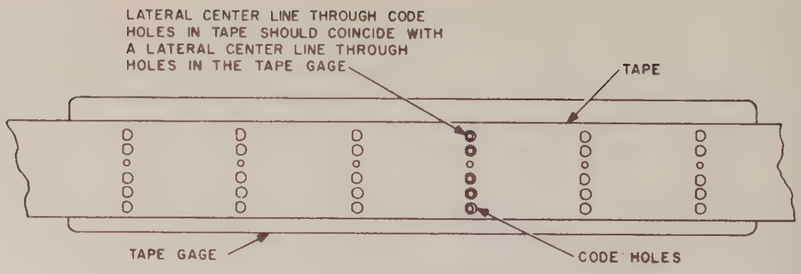
a. Requirement. The lateral centerline through the code holes in a sample tape (A, fig. 278), perforated to include a series of nine blank code combinations followed by one letters combination, should coincide with a lateral centerline through the tape gage.

b. Method of Checking. With power on, perforate a sample tape consisting of a series of nine blank code combinations followed by one letters combination. Open the chads so that the code holes are visible and place the tape over the tape gage with the letters combination feed holes engaging the feed pins. Check the sample tape for conformance with the requirement.

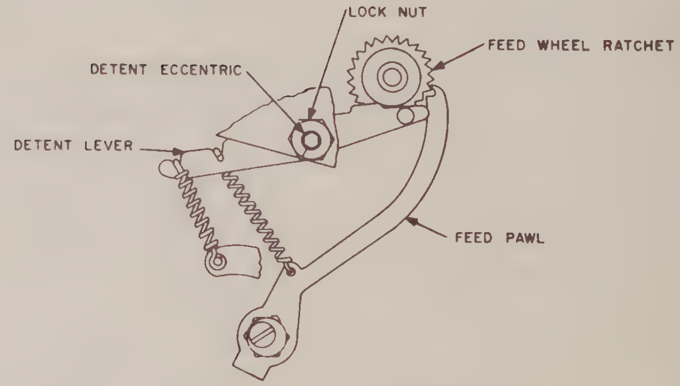
c. Adjustment. Loosen the locknut (B, fig. 278) on the detent eccentric. Rotate the eccentric clockwise to move the feed holes toward the hinged edge of the feed holes and counterclockwise to move the feed holes toward the trailing edge of the code holes. Tighten the locknut and refine the feed pawl adjustment (par. 388). Recheck the feed pawl adjustment. Check the related adjustment given in paragraph 376*a*.

392. Feed Hole Lateral Alignment Adjustment (fig. 279)

a. Requirement. The circular portion of the


LATERAL CENTER LINE THROUGH CODE HOLES IN TAPE SHOULD COINCIDE WITH A LATERAL CENTER LINE THROUGH HOLES IN THE TAPE GAGE
TAPE
TAPE GAGE
CODE HOLES

A. TOP VIEW


LOCK NUT
FEED WHEEL RATCHET
DETENT ECCENTRIC
DETENT LEVER
FEED PAWL

B. FRONT VIEW

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Figure 278. Punch detent.

code holes in a sample tape (A), perforated to contain a series of nine blank combinations followed by a letters combination, should be concentric with the holes in the tape gage.

b. Method of Checking. Prepare a sample tape as described in paragraph 391*b*. Check the sample tape for conformance with the requirement given in *a* above.

Note. The large holes in the tape gage are the same diameter as the circular portion of the code holes in the tape. The small holes in the gage serve as a guide for gaging.

c. Adjustment. Loosen the locknut (B) on the feed wheel adjusting screw and rotate the adjusting screw to obtain the requirement. Turn the adjusting screw clockwise to move the holes in the gage toward the reference edge of the tape (C). To move the holes in the gage away from the reference edge of the tape (D), turn the adjusting screw counterclockwise; tighten the locknut. Check the related adjustment given in paragraph 401, and refine it if necessary.

393. Punch Slide Spring Tension
(A, fig. 280)

a. Requirement. With the function clutch engaged, letters combination set up and the main shaft rotated until the punch slides are in their selected position under (but not touching) the punch pins, it should require 2¼ to 3¼ ounces to start each punch slide moving.

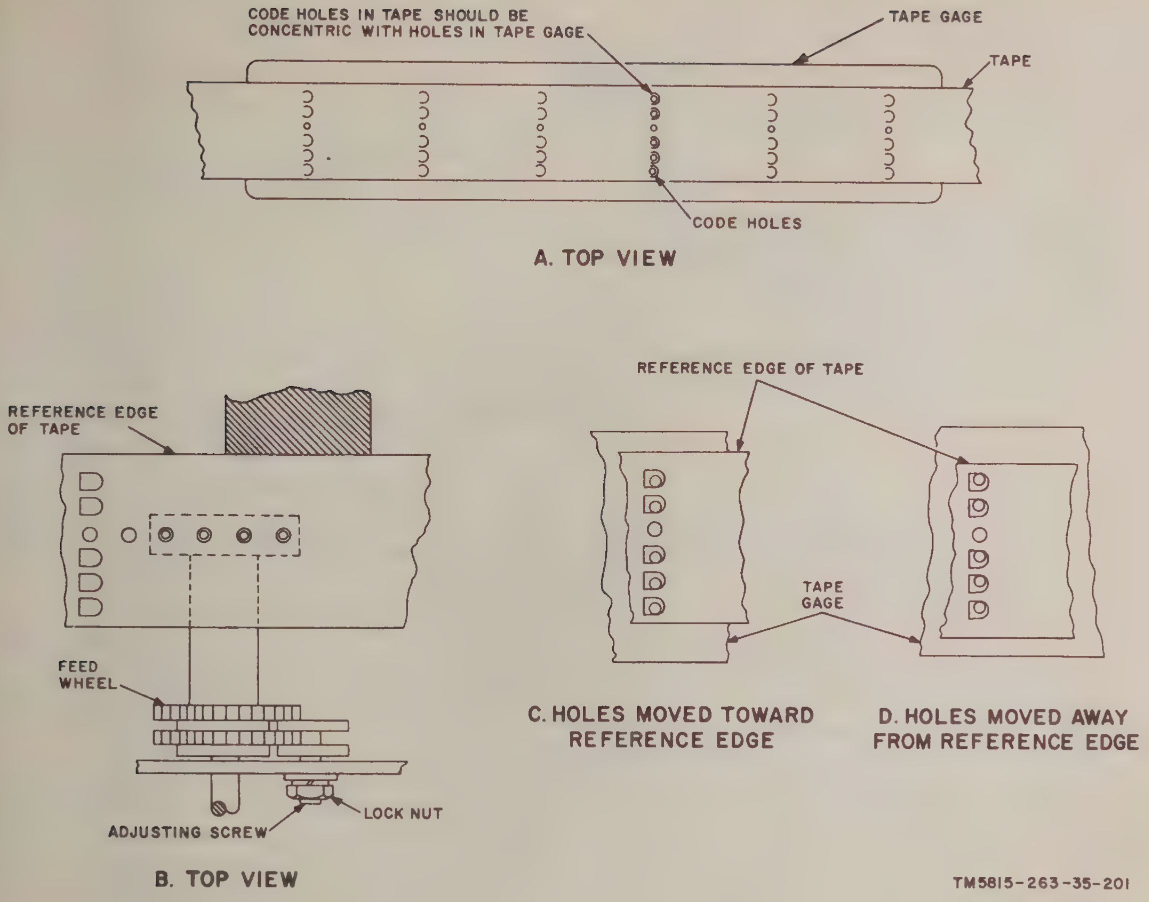

CODE HOLES IN TAPE SHOULD BE CONCENTRIC WITH HOLES IN TAPE GAGE
TAPE GAGE
TAPE
CODE HOLES
A. TOP VIEW
REFERENCE EDGE OF TAPE
FEED WHEEL
LOCK NUT
ADJUSTING SCREW
B. TOP VIEW
REFERENCE EDGE OF TAPE
TAPE GAGE
C. HOLES MOVED TOWARD REFERENCE EDGE
D. HOLES MOVED AWAY FROM REFERENCE EDGE
TM5815-263-35-201

Figure 279. Tape feed mechanism.

b. Method of Checking. Apply the push end of an 8-ounce scale to the left end of the punch slide and push toward the right. Measure the tension of five punch slide springs.

c. Adjustment. Replace any punch slide spring that fails to meet the requirement.

394. Punch Pin Compression Spring and Retractor Bail Spring Tension (fig. 280)

a. Requirements.

(1) *Compression spring.* With the function clutch disengaged and the retractor bail springs (C) unhooked at the lower end, it should require 19 to 32 ounces to move the retractor bail (B) away from the guide plate of the punch block.

(2) *Retractor bail spring.* With the function clutch disengaged it should require 4 to 5 pounds to start the retractor bail moving (C).

b. Method of Checking.

(1) To check the requirement given in *a*(1) above, unhook the lower end of each retractor bail spring (C). Hook a 32-ounce scale under the No. 3 punch pin, (B) and pull in an upward direction. Rehook the retractor bail springs.

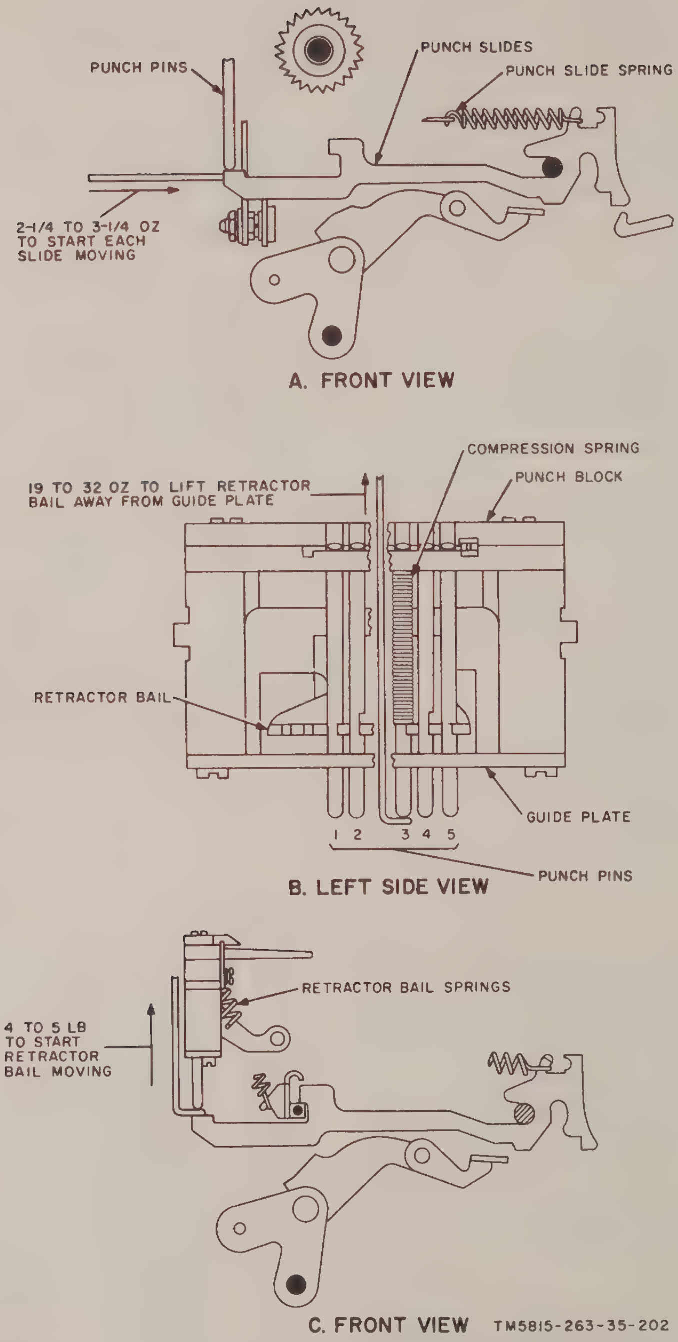

PUNCH PINS
PUNCH SLIDES
PUNCH SLIDE SPRING
2-1/4 TO 3-1/4 OZ TO START EACH SLIDE MOVING
A. FRONT VIEW
COMPRESSION SPRING
19 TO 32 OZ TO LIFT RETRACTOR BAIL AWAY FROM GUIDE PLATE
PUNCH BLOCK
RETRACTOR BAIL
GUIDE PLATE
1 2 3 4 5
PUNCH PINS
B. LEFT SIDE VIEW
RETRACTOR BAIL SPRINGS
4 TO 5 LB TO START RETRACTOR BAIL MOVING
C. FRONT VIEW
TM5815-263-35-202

Figure 280. Punch mechanism.

(2) To measure the combined compression and retractor bail spring tension given in *a*(2) above, hook a 12-pound scale under the No. 3 punch pin and pull in an upward direction.

c. Adjustment. Replace the compression spring if it fails to meet the requirements *a*(1) above, and the retractor bail springs if they do not meet the requirement given in *a*(2).

395. Tape Guide Spring (Tape Chute) Tension
(A, fig. 281)

a. Requirement. With the function clutch disengaged and the tape threaded through the punch assembly, it should require ½ to 1 ounce to just move the tape guide spring away from the tape.

b. Method of Checking. Hook an 8-ounce scale over the tape guide spring, at the point where the spring touches the tape, and pull away from the tape.

c. Adjustment. Bend the spring to obtain the requirement.

396. Tape Guide Spring (Punch Block) Adjustment
(fig. 281)

a. Requirements.

(1) With the tape removed from the punch block, the tape guide spring (B) should rest against the clearance slot in the block in a symmetrical manner (as gaged by eye).

(2) With tape in the punch block and the perforator operating under power, the spring should not distort the edge of the tape.

b. Adjustment

(1) To obtain the requirement given in *a*(1) above, bend the spring so that it just rests against the side of the clearance slot in the block. Loosen the tape guide spring mounting screw (C) and position the spring so that it is symmetrical about the tape opening; tighten the mounting screw.

(2) Refine the adjustment given in *b*(1) above, if requirement *a*(2) above is not completely fulfilled.

397. Feed Pawl Spring Tension
(A, fig. 282)

a. Requirement. With the function clutch disengaged and the detent lever spring unhooked from the spring position plate, it should require 3 to 4½ ounces to start the detent lever moving.

b. Method of Checking. Unhook the detent lever spring from the spring position plate. Hook an 8-ounce scale over the end of the detent lever and pull in an upward direction. Rehook the detent lever spring on the plate.

c. Adjustment. Replace the feed pawl spring if it fails to meet the requirement.

398. Detent Lever Spring Tension
(B, fig. 282)

a. Requirement. With the function clutch disengaged and the feed pawl spring unhooked from the feed pawl, it should require 7 to 10 ounces to start the detent lever moving.

b. Method of Checking. Unhook the feed pawl spring from the feed pawl. Hook a 32-ounce scale over the end of the detent lever and pull in an upward direction. Rehook the feed pawl spring on the feed pawl.

c. Adjustment. Replace the detent lever spring if it fails to meet the requirement.

399. Tape Depressor Slide Spring Tension

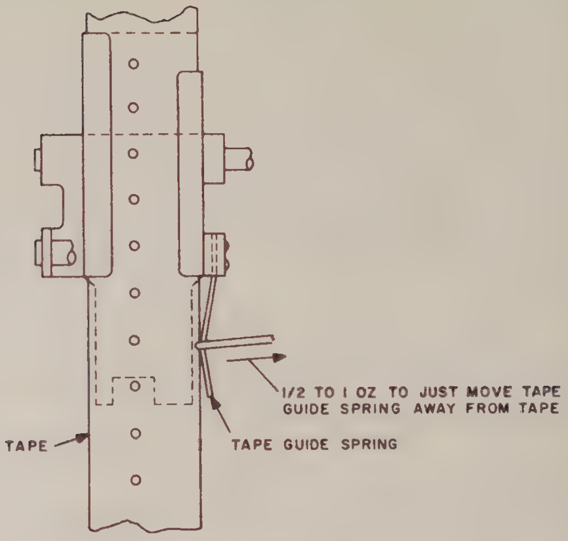
a. Requirement. With the function clutch engaged and the main shaft rotated until the rocker bail (A, fig. 270) is in its extreme left position, it should require 1½ to 2½ ounces to start the tape depressor slide (C, fig. 282) moving.

b. Method of Checking. With the rocker bail in its extreme left position, apply the push end of an 8-ounce scale to the left end of the tape depressor slide and push toward the right.

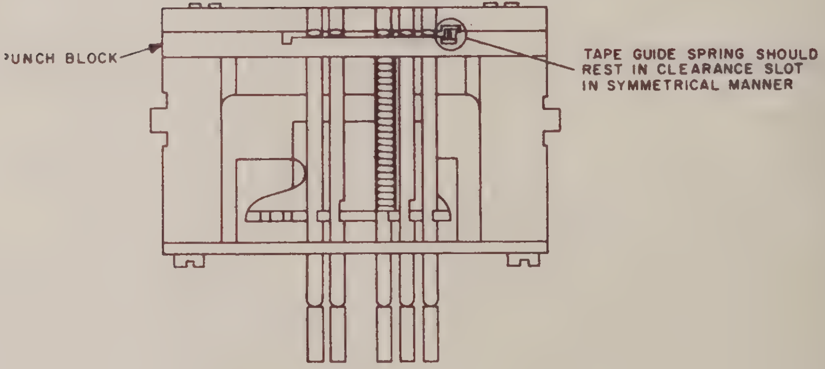
c. Adjustment. Replace the depressor slide spring if it fails to meet the requirement.

400. Tape Shoe Torsion Spring Tension
(A, fig. 283)

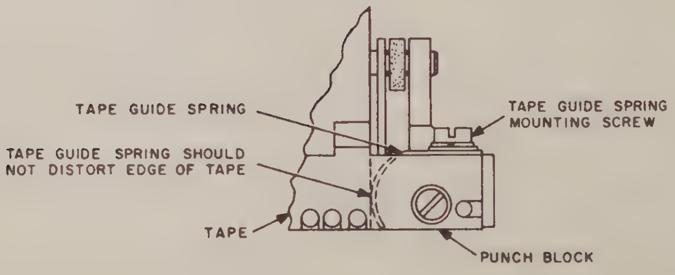
a. Requirement. It should require 13 to 18 ounces to move the tape shoe from the feed wheel.


1/2 TO 1 OZ TO JUST MOVE TAPE GUIDE SPRING AWAY FROM TAPE
TAPE
TAPE GUIDE SPRING

A. TOP LEFT SIDE VIEW


PUNCH BLOCK
TAPE GUIDE SPRING SHOULD REST IN CLEARANCE SLOT IN SYMMETRICAL MANNER

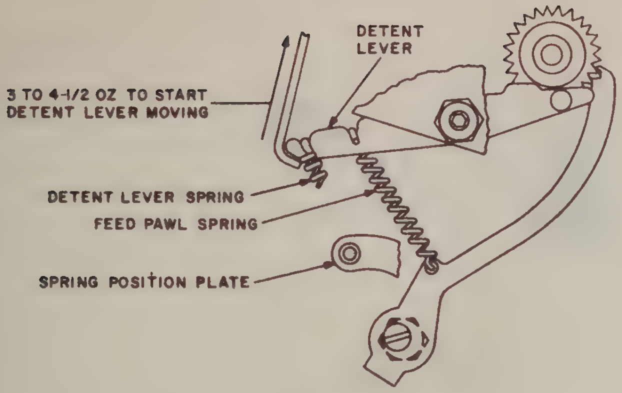
B. LEFT SIDE VIEW


TAPE GUIDE SPRING
TAPE GUIDE SPRING SHOULD NOT DISTORT EDGE OF TAPE
TAPE
TAPE GUIDE SPRING MOUNTING SCREW
PUNCH BLOCK

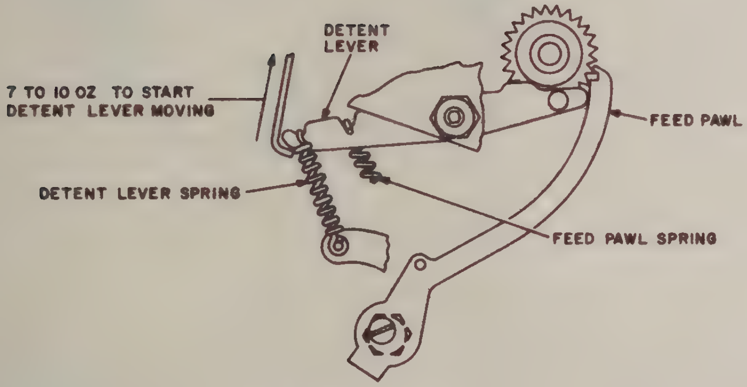
C. TOP LEFT SIDE VIEW

TM5815-263-35-203

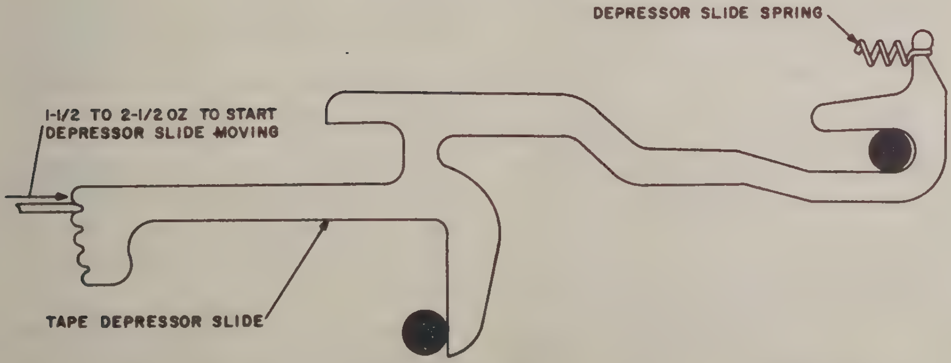
Figure 281. Punch mechanism.


DETENT LEVER
3 TO 4-1/2 OZ TO START DETENT LEVER MOVING
DETENT LEVER SPRING
FEED PAWL SPRING
SPRING POSITION PLATE

A. FRONT VIEW


DETENT LEVER
7 TO 10 OZ TO START DETENT LEVER MOVING
FEED PAWL
DETENT LEVER SPRING
FEED PAWL SPRING

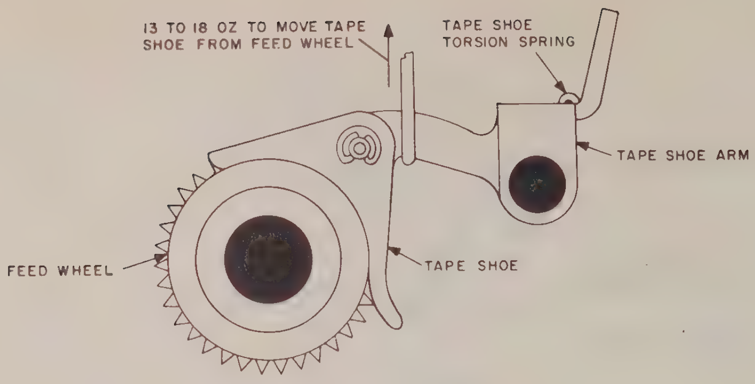
B. FRONT VIEW


DEPRESSOR SLIDE SPRING
1-1/2 TO 2-1/2 OZ TO START DEPRESSOR SLIDE MOVING
TAPE DEPRESSOR SLIDE

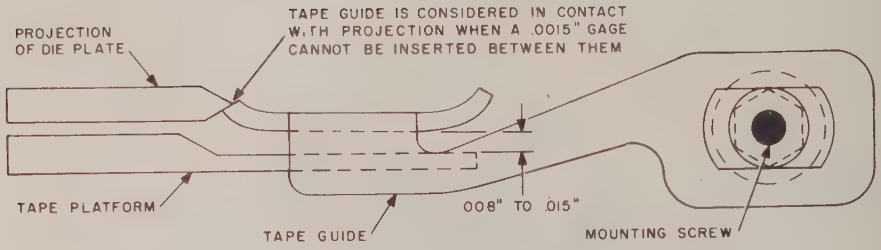
C. FRONT VIEW

TM5815-263-35-204

Figure 282. Tape feed mechanism.


13 TO 18 OZ TO MOVE TAPE SHOE FROM FEED WHEEL
TAPE SHOE TORSION SPRING
TAPE SHOE ARM
FEED WHEEL
TAPE SHOE

A. FRONT VIEW


PROJECTION OF DIE PLATE
TAPE GUIDE IS CONSIDERED IN CONTACT WITH PROJECTION WHEN A .0015" GAGE CANNOT BE INSERTED BETWEEN THEM
TAPE PLATFORM
TAPE GUIDE
.008" TO .015"
MOUNTING SCREW

B FRONT VIEW

TM5815-263-35-205

Figure 283. Feed wheel and tape guide.

b. Method of Checking. Hook a 32-ounce scale under the tape shoe arm, just to the right of the tape shoe, and pull upward.

c. Adjustment. Replace the tape shoe torsion spring if it fails to meet the requirement.

401. Tape Guide Adjustment

a. Requirement. With the tape guide (B, fig. 283) under and in contact with the V-shaped projection of the die plate there should be .008- to .015-inch clearance between the tape guide and tape platform.

Note. The tape guide is considered in contact with the V-shaped projection of the die plate when a .0015-inch gage cannot be inserted between them.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler or round wire gage.

c. Adjustment. Loosen the tape guide mounting screw friction tight. Place a .010-inch flat feeler gage between the tape guide and tape platform. Press the guide down and to the left. Tighten the mounting screw, keeping the feed wheel adjusting screw (B, fig. 279) stationary by means of an Allen wrench. Check the related adjustment given in paragraph 402.

402. Release Downstop Bracket Adjustment (fig. 284)

a. Requirement. When the friction clutch is just tripped, there should be .002- to .045-inch clearance between the trip lever and clutch shoe lever at the point where the clearance is the least.

b. Method of Checking. With the function clutch tripped, measure the clearance with a flat feeler or round wire gage.

c. Adjustment. Loosen the mounting screws on the downstop bracket to friction tightness.

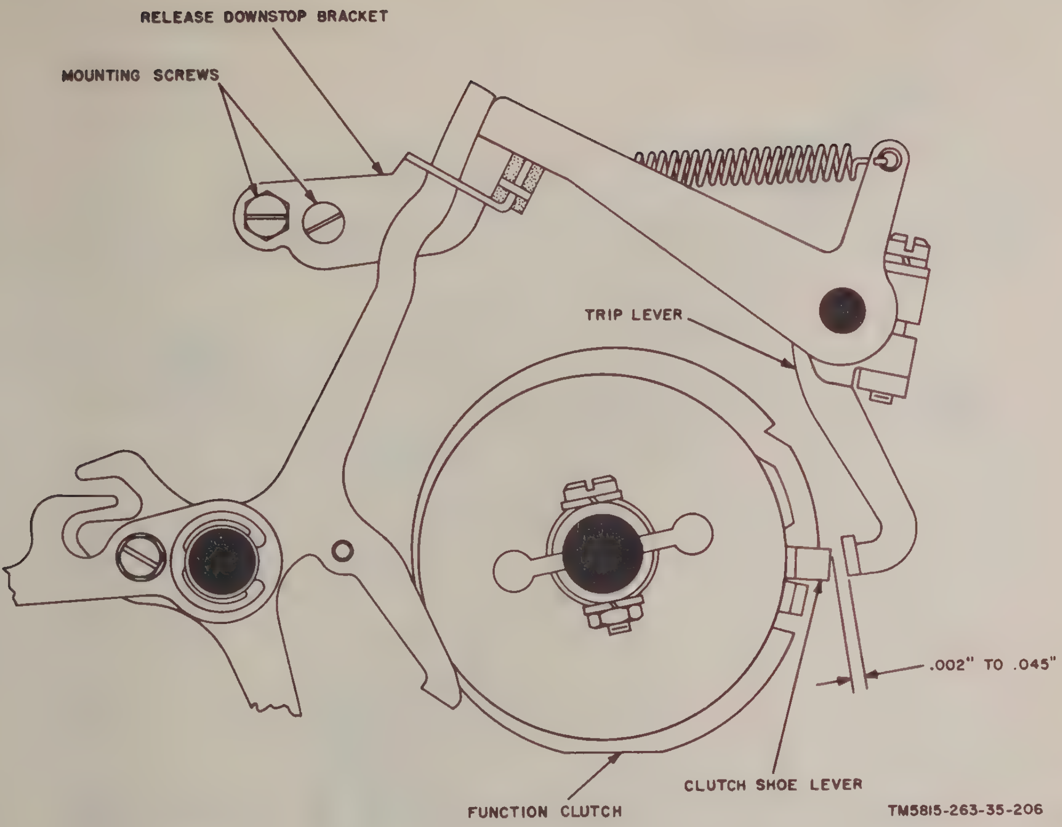


Figure 284. Function mechanism, front view.

Position the bracket to obtain the requirement; tighten the mounting screws.

403. Push Bar Operating Blade Adjustment (Preliminary)

a. Requirement. With the function clutch tripped; letters combination selected, and the No. 2 and 3 bell cranks (A, fig. 285) held against the stop post, the operating blade should be parallel to (but not necessarily flush with) the top of the No. 2 and 3 push bar (B, 285) latching surface (A, fig. 285).

b. Adjustment. Loosen the mounting screws on the transfer mounting bracket (B, fig. 288) to friction tightness. Pry the mounting bracket all the way to the right. Add or remove shims (A, fig. 285) under the push bar operating blade, as required. Place extra shims on the rear mounting screw between the blade and flat washer. Leave the mounting screws (B, fig. 288) friction tight until the adjustment given in paragraph 409 is completed. Check the related adjustments given in paragraphs 404, 406, and 408.

404. Push Bar Operating Blade Adjustment (Final)

(B, fig. 285)

a. Requirements. With the function clutch tripped, and the letters combination selected, and the push bars seated in the detented position, the requirements given in (1) and (2) below should be met:

(1) There should be .015- to .025-inch clearance between the push bar operating blade and the left edge of the

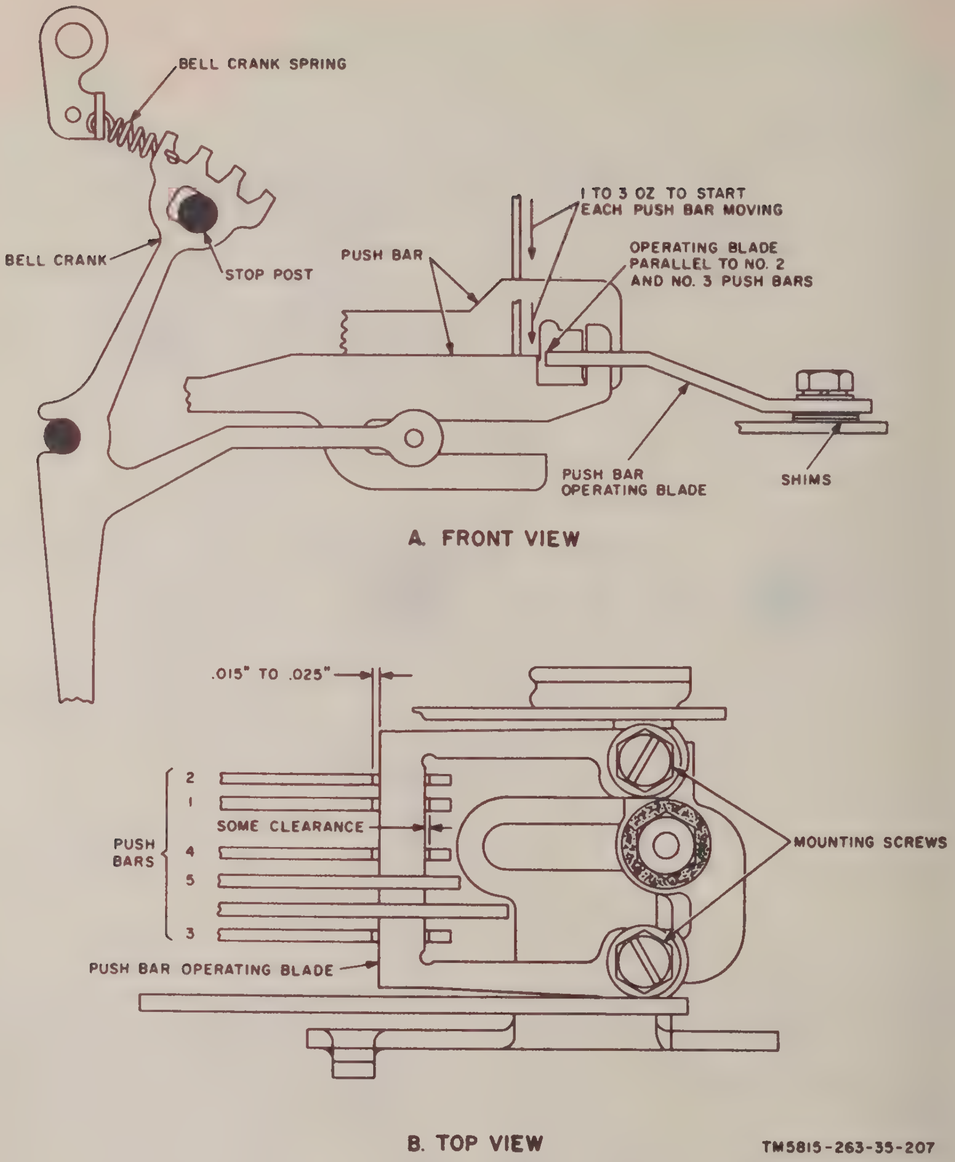

BELL CRANK SPRING
BELL CRANK
STOP POST
PUSH BAR
1 TO 3 OZ TO START EACH PUSH BAR MOVING
OPERATING BLADE PARALLEL TO NO. 2 AND NO. 3 PUSH BARS
PUSH BAR OPERATING BLADE
SHIMS
A. FRONT VIEW
.015" TO .025"
PUSH BARS
2
1
SOME CLEARANCE
4
5
3
MOUNTING SCREWS
PUSH BAR OPERATING BLADE
B. TOP VIEW
TM5815-263-35-207

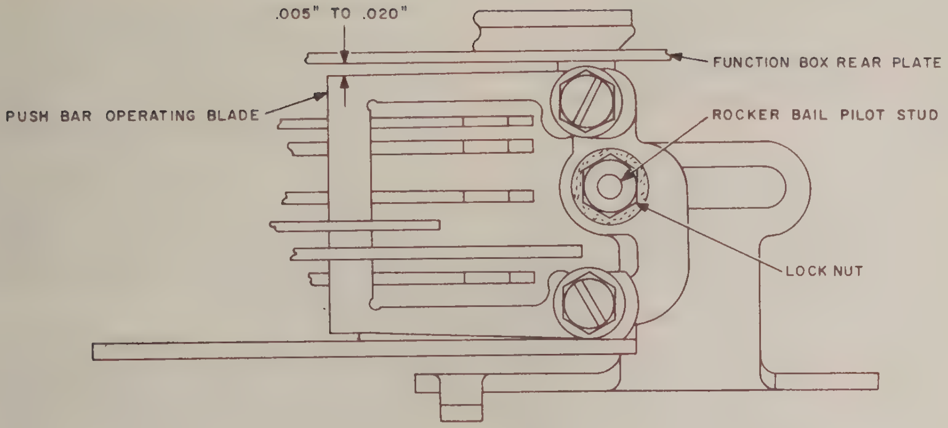
Figure 285. Function mechanism.

notch in the nearest push bar, after play in the push bar has been taken up by manually moving it to the rear and to the left and then releasing it.

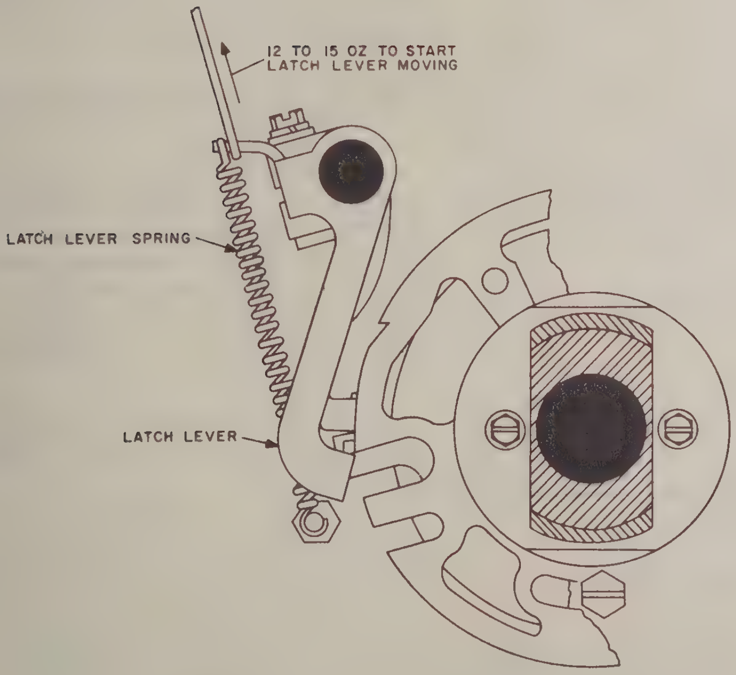
(2) There should be some clearance between the right edge of the operating blade and all push bars when play in each push bar is taken up by manually moving it to the right and then releasing it.

(3) With the function clutch in the stop (disengaged) position, the requirement given in (2) above should be met.

b. Adjustment. Loosen the mounting screws on the push bar operating blade. Position the


.005" TO .020"
FUNCTION BOX REAR PLATE
PUSH BAR OPERATING BLADE
ROCKER BAIL PILOT STUD
LOCK NUT

A. TOP VIEW


12 TO 15 OZ TO START LATCH LEVER MOVING
LATCH LEVER SPRING
LATCH LEVER

B. REAR VIEW

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Figure 286. Function mechanism.

operating blade to obtain requirements *a*(1) through (3) above; tighten the mounting screws.

405. Bell Crank Spring Tension
(A, fig. 285)

a. Requirement. With the function clutch tripped and the letters combination selected, it should require 1 to 3 ounces to start each push bar moving.

b. Method of Checking. Apply the push end of an 8-ounce scale on the left side of the No. 1, 2, 3, and 4 push bar latching surfaces and on the left top surface of the No. 5 push bar. Push downward on each push bar. Measure the tension of all five bell crank springs.

c. Adjustment. Replace any bell crank spring that fails to meet the requirement.

Note. It may be necessary to refine this adjustment after the rocker bail pilot stud adjustment (par. 406) is made.

406. Rocker Bail Pilot Stud Adjustment
(A, fig. 286)

a. Requirement. With the function clutch tripped; blank combination selected, and the main shaft rotated until the rocker bail is in its extreme left position, there should be .005- to .020-inch clearance between the function box rear plate and the push bar operating blade when play is taken up to make the clearance a minimum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler or round wire gage.

c. Adjustment. Loosen the locknut on the rocker bail pilot stud. Position the push bar operating blade to obtain the requirement; tighten the locknut. Check the related adjustment given in paragraph 404.

407. Function Clutch Latch Spring Tension
(B, fig. 286)

a. Requirement. With the function clutch turned to the stop position but with the latch lever not latched, it should require 12 to 15 ounces to start the latch lever moving.

b. Method of Checking. Hook a 32-ounce scale under the spring lug and pull in line with the spring.

c. Adjustment. Replace the latch lever spring if it fails to meet the requirement.

408. Function Box Adjustment
(fig. 287)

a. Requirement. With the letters code combination manually selected; main shaft rotated until the function clutch trips and the punch slides are disengaged from the punch slide (A, fig. 276) and the push bar operating blade just touches the push bars, the top of the operating bail blade (A) should be flush or within .020-inch below the tops of the No. 2 and No. 3 push bars when play is taken up by manually moving each bar in a downward direction and then releasing it.

b. Adjustment. Loosen three mounting screws (B) on the function box rear plate, and one mounting screw on the front plate. Insert a screwdriver blade in the pry point and position the function box to obtain the requirement; tighten the mounting screws. Check the position of the bell crank spring bracket. Check the related adjustments given in paragraphs 410, 416, and 409.

409. Transfer Mounting Bracket Adjustment
(fig. 288)

a. Requirement. With the blank combination selected; the punch slides latched (A, fig. 276) and the function clutch tripped, there should be .001- to .018-inch clearance between the bell crank (A) and stop post at the bell crank where the clearance is the maximum when the bell crank with the minimum clearance is touching the post.

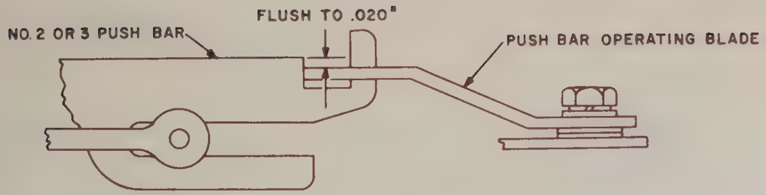
b. Method of Checking. Measure the clearance given in the requirement with a round wire gage.

c. Adjustment. With the transfer mounting bracket screws friction tight (B), pry the bracket to the left until the closest bell crank touches the stop post. Tighten the mounting screws and recheck the requirement.

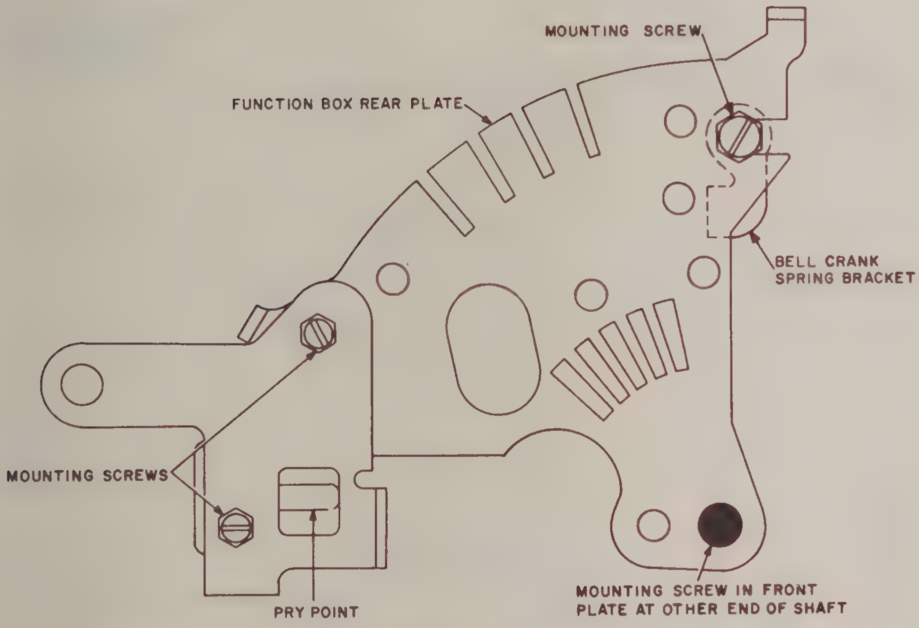
Note. The bell crank that yields the most, should not yield more than .007 inch as measured at the stop post.

410. Letters and Figures Yield Arms Adjustment

Note. To facilitate measuring the clearances given in requirements *a*(1) and (2) below, remove the func-


FLUSH TO .020"
NO. 2 OR 3 PUSH BAR
PUSH BAR OPERATING BLADE

A. FRONT VIEW


MOUNTING SCREW
FUNCTION BOX REAR PLATE
BELL CRANK SPRING BRACKET
MOUNTING SCREWS
PRY POINT
MOUNTING SCREW IN FRONT PLATE AT OTHER END OF SHAFT

B. REAR VIEW

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Figure 287. Function box mechanism.

tion blades (par. 132*a*(2)), and after the adjustment has been made, replace the function blades (par. 132*d*).

a. Requirements. With the function clutch tripped and the main shaft rotated until the rocker bail is in its extreme left position, the following requirements should be met:

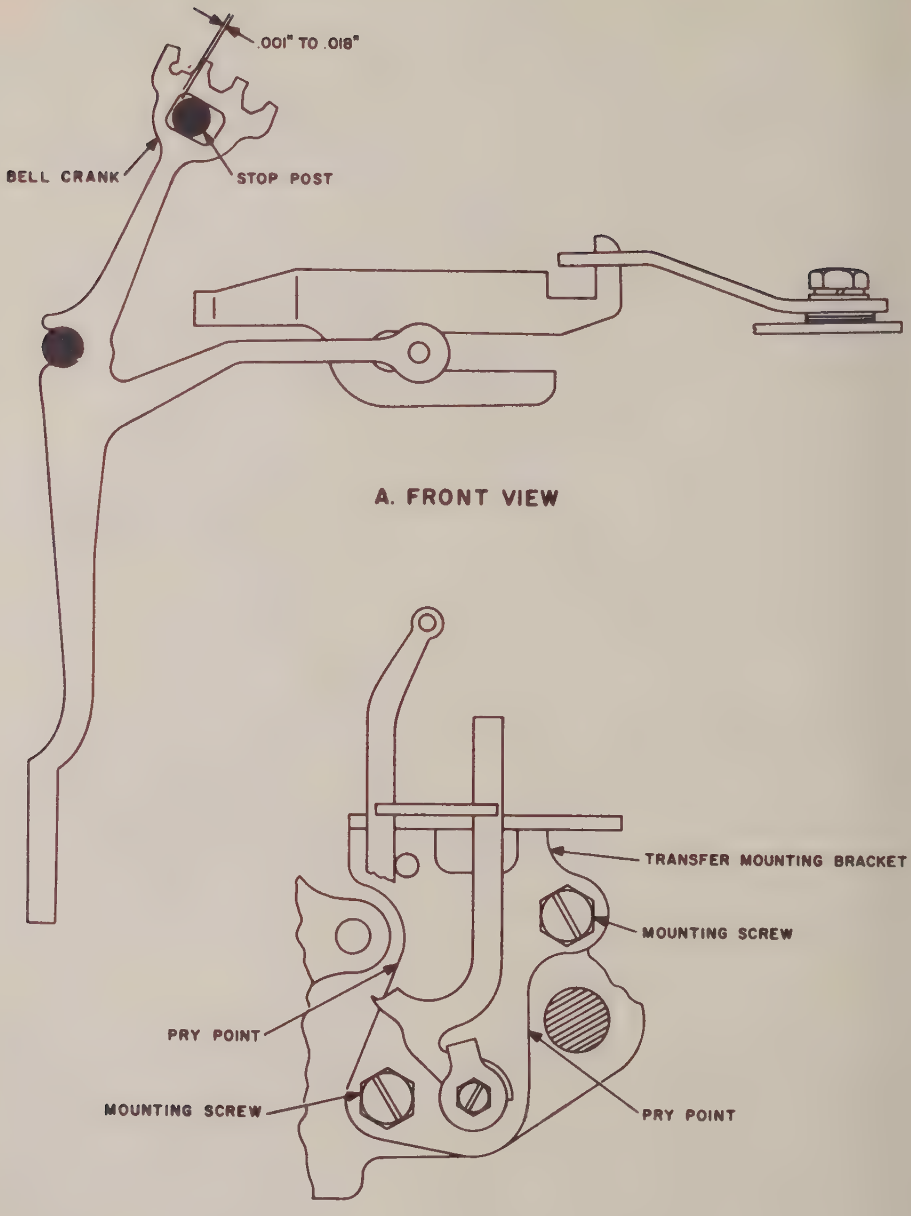
(1) With the arm assemblies (B, fig. 289) manually placed in the letters position and the letters-figures bell crank (A, fig. 289) held against the left edge of the stop post, there should be .001- to .006-inch clearance between the letters-figures bell crank and the letters extension arm.

(2) With the arm assemblies (B, fig. 290) manually placed in the figures position and the letters-figures bell crank (A, fig. 290) held against the right edge of the stop post, there should be .001- to .006-inch clearance between the letters-figures bell crank and the figures extension arm.

b. Method of Checking. Measure the clearance given in requirements *a*(1) and (2) above, with the flat feeler gage.

c. Adjustments.

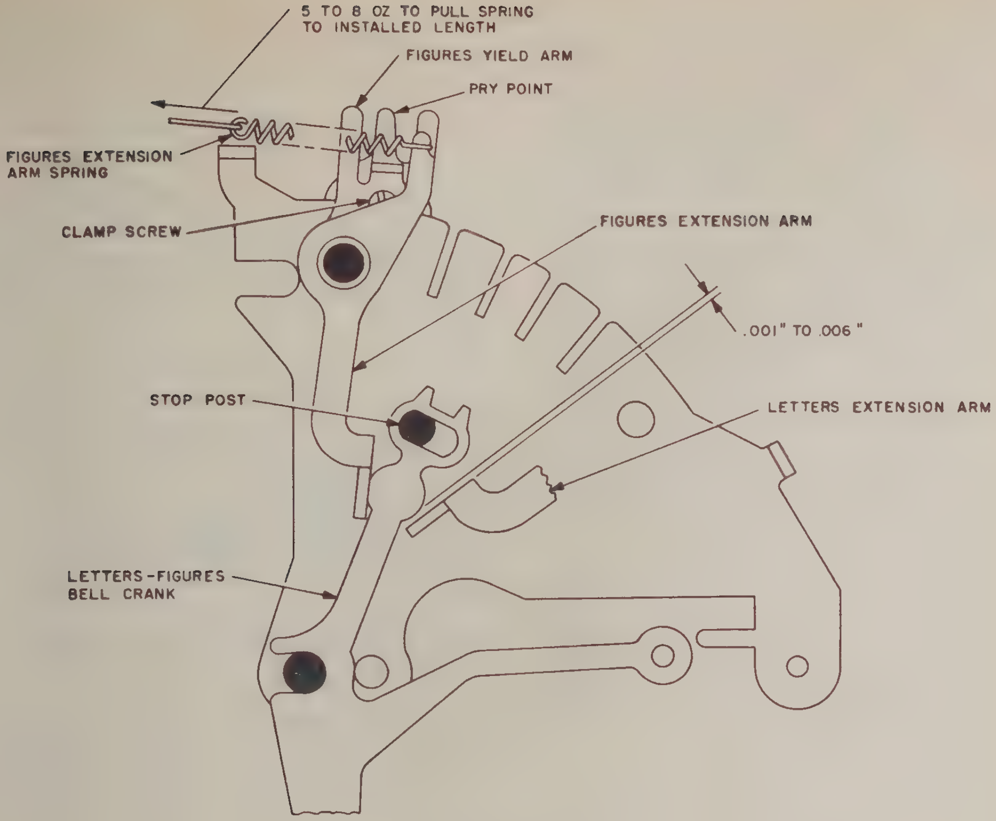
(1) Loosen the clamp screws in both the figures and letters yield arms (A, fig.


.001" TO .018"
BELL CRANK
STOP POST
TRANSFER MOUNTING BRACKET
MOUNTING SCREW
PRY POINT
MOUNTING SCREW
PRY POINT
TM5815-263-35-210

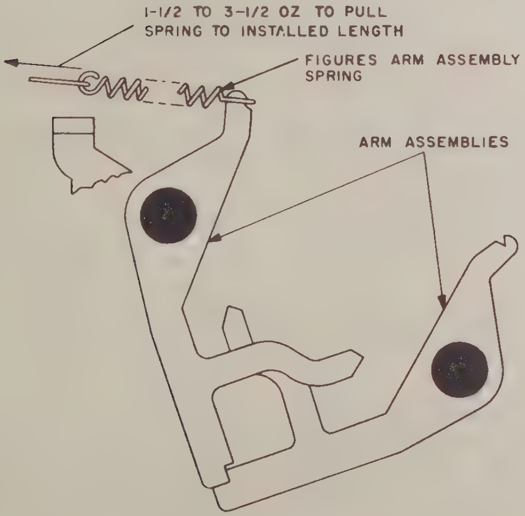
A. FRONT VIEW

B. FRONT VIEW

Figure 288. Transfer mechanism.


5 TO 8 OZ TO PULL SPRING TO INSTALLED LENGTH
FIGURES YIELD ARM
PRY POINT
FIGURES EXTENSION ARM SPRING
CLAMP SCREW
FIGURES EXTENSION ARM
.001" TO .006"
STOP POST
LETTERS EXTENSION ARM
LETTERS-FIGURES BELL CRANK

A. FRONT VIEW


1-1/2 TO 3-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH
FIGURES ARM ASSEMBLY SPRING
ARM ASSEMBLIES

B. FRONT VIEW

TM5815-263-35-211

Figure 289. Function box mechanism.

289 and A, fig. 290). Manually place the arm assemblies (B, fig. 289) in the letters position. Hold the letters-figures bell crank against the left side of the stop post, and by means of the pry point (A, fig. 290), position the letters yield arm to obtain the requirement given in *a*(1) above; tighten the letters yield arm clamp screw.

(2) Manually place the arm assemblies (B, fig. 290) in the figures position. Hold the letters-figures bell crank against the right side of the post, and by means of the pry point (A, fig. 289), position the figures yield arm to obtain the requirement given in *a*(2) above; tighten the figures yield arm clamp screw.

***Caution:* During the adjustment of the yield arms, tightening of the clamp screws may cause the arm assemblies to change position. Recheck the requirements before proceeding with the next adjustment.**

411. Figures Arm Assembly Spring Tension
(B, fig. 289)

a. Requirement. With the arm assemblies manually placed in the letters position, it should require 1½ to 3½ ounces to pull the figures arm assembly spring to its installed length.

b. Method of Checking. Unhook the left end of the figures arm assembly spring. Hook an 8-ounce scale in the spring loop and pull toward the left; rehook the spring.

c. Adjustment. Replace the figures arm assembly spring if it fails to meet the requirement.

412. Figures Extension Arm Spring Tension
(A, fig. 289)

a. Requirement. With the arm assemblies in the letters position and the letters extension arm manually held in position, it should require 5 to 8 ounces to pull the figures extension arm spring to its installed length.

b. Method of Checking. Unhook the left end of the figures extension arm spring. Hook a 32-ounce scale in the spring loop and pull toward the left.

c. Adjustment. Replace the figures extension arm spring if it fails to meet the requirement.

413. Letters Arm Assembly Spring Tension
(B, fig. 290)

a. Requirement. With the arm assemblies manually placed in the figures position, it should require 1½ to 3½ ounces to pull the letters arm assembly spring to its installed length.

b. Method of Checking. Unhook the lower end of the letters arm assembly spring. Hook an 8-ounce scale in the spring loop and pull downward at an approximate right angle to the lower arm.

c. Adjustment. Replace the letters arm assembly spring if it fails to meet the requirement.

414. Letters Extension Arm Spring Tension
(A, fig. 290)

a. Requirement. With the arm assemblies in the figures position and the letters extension arm manually held in position, it should require 5 to 8 ounces to pull the letters extension spring to its installed length.

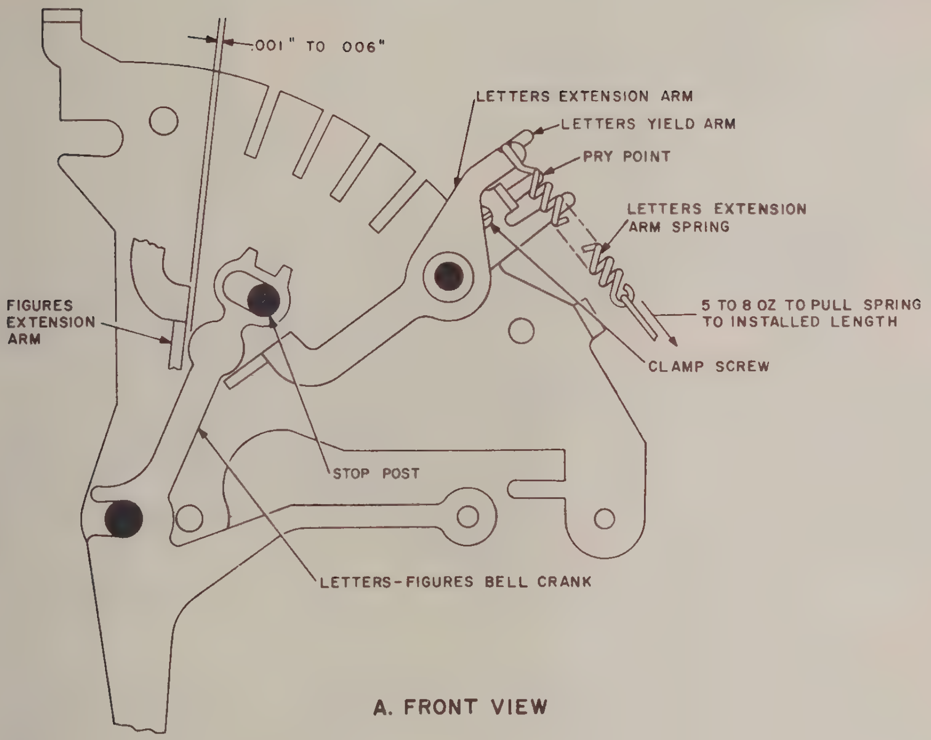
b. Method of Checking. Unhook the lower end of the letters extension arm spring. Hook a 32-ounce scale in the spring loop and pull downward at a right angle to the extension arm.

c. Adjustment. Replace the letters extension arm spring if it fails to meet the requirement.

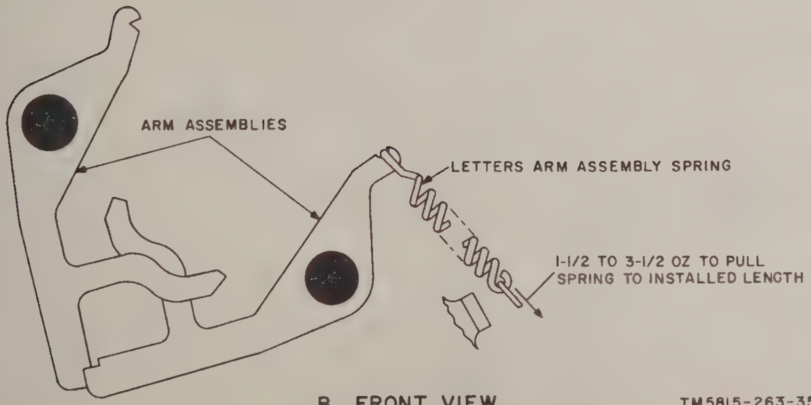
415. Lifter Arm Adjustment
(A, fig. 291)

a. Requirement. When the rocker bail is in its extreme left or right position, there should be approximately equal travel on each dwell surface.

b. Method of Checking. Trip the function clutch and rotate the main shaft until the rocker bail is in its extreme left position. Observe travel of the lifter arm roller on the right dwell surface. Rotate the main shaft until the rocker bail is moved to the extreme right position and observe travel of the lifter arm roller on the left dwell surface.


.001" TO .006"
LETTERS EXTENSION ARM
LETTERS YIELD ARM
PRY POINT
LETTERS EXTENSION ARM SPRING
5 TO 8 OZ TO PULL SPRING TO INSTALLED LENGTH
CLAMP SCREW
FIGURES EXTENSION ARM
STOP POST
LETTERS-FIGURES BELL CRANK

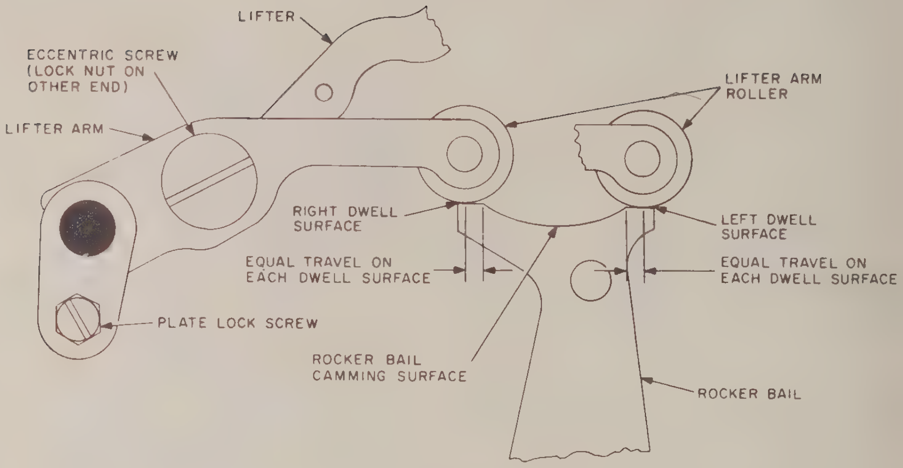
A. FRONT VIEW


ARM ASSEMBLIES
LETTERS ARM ASSEMBLY SPRING
1-1/2 TO 3-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH

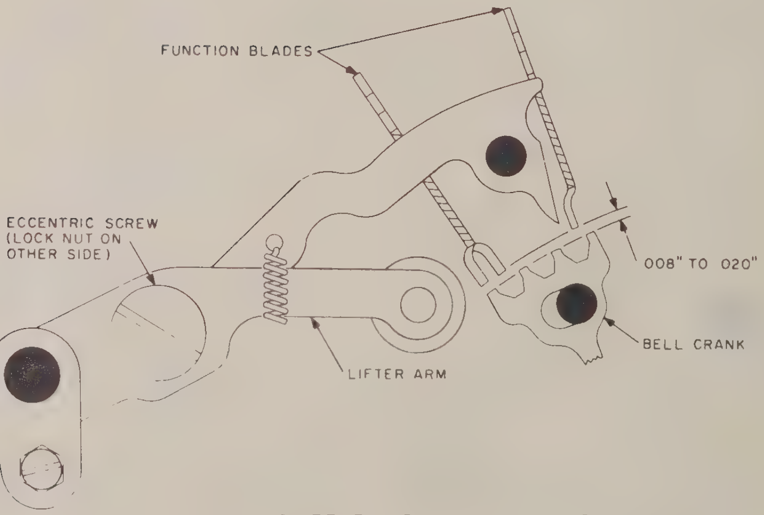
B. FRONT VIEW

TM5815-263-35-212

Figure 290. Function box mechanism.


LIFTER
ECCENTRIC SCREW (LOCK NUT ON OTHER END)
LIFTER ARM
LIFTER ARM ROLLER
RIGHT DWELL SURFACE
LEFT DWELL SURFACE
EQUAL TRAVEL ON EACH DWELL SURFACE
EQUAL TRAVEL ON EACH DWELL SURFACE
PLATE LOCK SCREW
ROCKER BAIL CAMMING SURFACE
ROCKER BAIL

A. REAR VIEW


FUNCTION BLADES
ECCENTRIC SCREW (LOCK NUT ON OTHER SIDE)
.008" TO .020"
BELL CRANK
LIFTER ARM

B. REAR VIEW

TM5815-263-35-213

Figure 291. Function box mechanism.

c. Adjustment. Loosen the plate lock screw and the eccentric screw locknut to friction tightness. Position the lifter arm to the left, or right, to obtain the requirement. Tighten the plate lock screw but do not tighten the eccentric locknut until the adjustment given in paragraph 416 is completed.

416. Lifter Arm Eccentric Screw Adjustment
(B, fig. 291)

a. Requirement. With the function clutch disengaged, there should be .008- to .020-inch clearance between the closest projection of the bell cranks and the projection on the letters or figures function blade.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler or round wire gage.

c. Adjustment. With the eccentric screw locknut friction tight, rotate the eccentric screw to obtain the requirement; tighten the locknut. Check the related adjustment given in paragraph 417.

417. Lock Lever Adjustment
(A, fig. 292)

a. Requirements.

(1) With the letters combination selected and the rocker bail in its extreme left position, it should be possible to move the toggle linkage through a point where the toggle link (A, fig. 292) and lock lever are in a straight line without the lifter being raised.

(2) With the toggle link and lock lever held in a straight line, there should be .001- to .015-inch clearance between the toggle link and lifter pin.

Note. It may be necessary to remove the retaining ring on the end of the lifter pin to measure the clearance.

b. Adjustment. Loosen the clamp screw on the lock lever to friction tightness. Position the lock lever on the lock arm, up or down, to obtain the requirements given in *a*(1) and (2) above; tighten the clamp screw.

418. No. 5 Pulse Beam Spring Tension
(B, fig. 292)

a. Requirement. It should require 10 to 15 ounces to pull the No. 5 pulse beam spring to a $\frac{7}{16}$ inch length.

b. Method of Checking. Unhook one end of the No. 5 pulse beam spring. Hook a 32-ounce scale in the spring loop and pull spring along the side of a suitable rule .

c. Adjustment. Replace the No. 5 pulse beam spring if it fails to meet the requirement.

419. Lock Lever Trip Roller Adjustment
(fig. 293)

a. Requirement. When the rocker bail approaches its extreme right hand position, the lock lever toggle linkage should break and the lifter arm roller should drop onto the right dwell surface.

b. Method of Checking. Trip the function clutch and rotate the main shaft until the rocker bail approaches its extreme right position, then visually check the requirement.

c. Adjustment. Loosen the clamp screw on the lock lever trip post to friction tightness. Position the lock lever trip roller to the left or right with a screwdriver to obtain the requirement; tighten the clamp screw.

420. Toggle Link Spring Tension
(A, fig. 294)

a. Requirement. With the function clutch disengaged, it should require $1\frac{1}{2}$ to $2\frac{1}{4}$ ounces to pull the toggle link spring to its installed length.

b. Method of Checking. Unhook the toggle link spring from the spring post on the lifter. Hook an 8-ounce scale in the spring loop and pull toward the post.

c. Adjustment. Replace the toggle link spring if it fails to meet the requirement.

421. Function Blade Spring Tension
(A, fig. 294)

a. Requirement. It should require 7 to 10 ounces to start each function blade moving.

b. Method of Checking. Hook a 32-ounce scale under the function blade, just behind the spring, and pull in line with the spring. Measure the tension of both springs.

c. Adjustment. Replace either one of the function blade springs if it fails to meet the requirement.

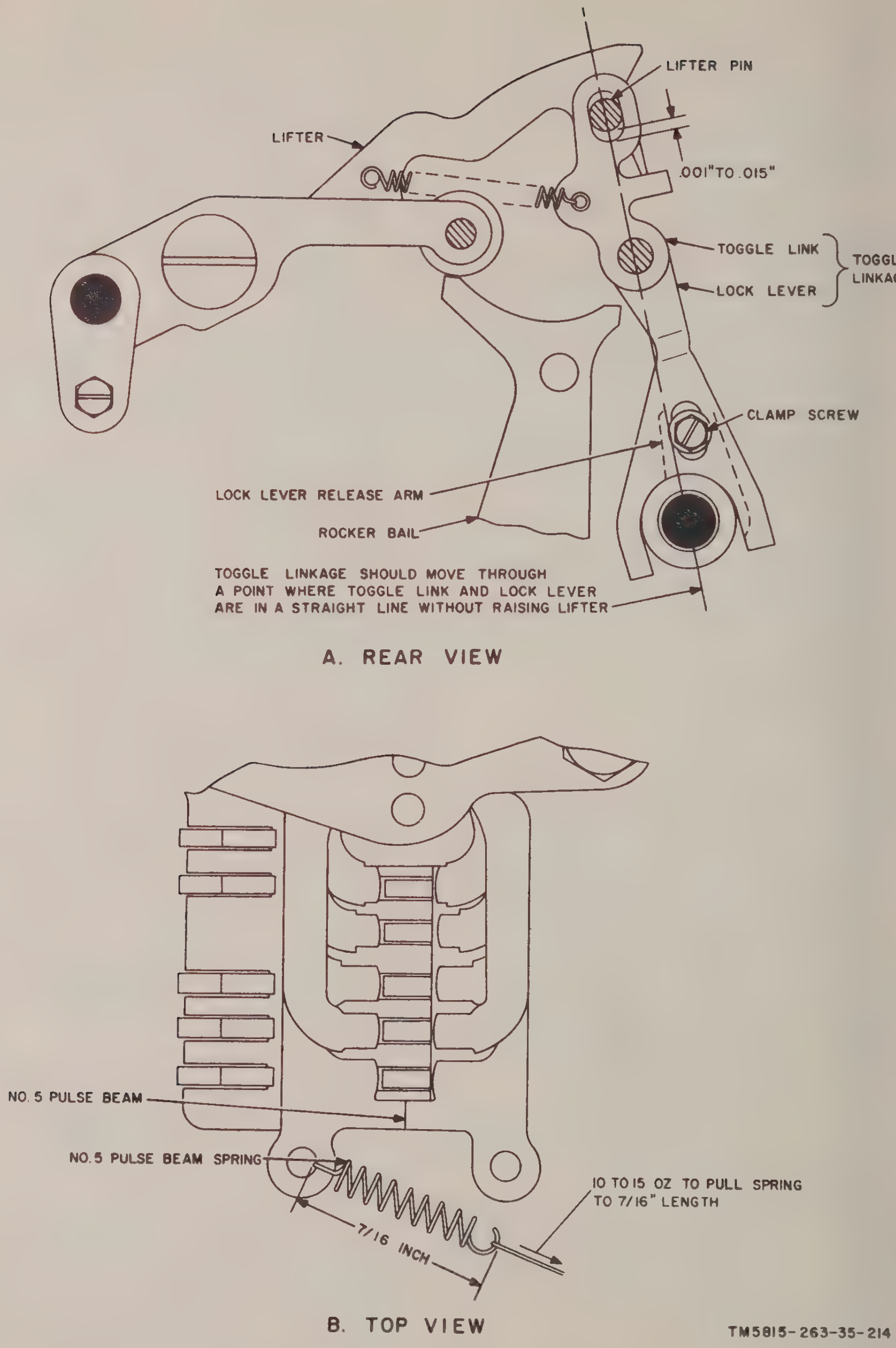

LIFTER PIN
LIFTER
.001" TO .015"
TOGGLE LINK
LOCK LEVER
TOGGLE LINKAGE
CLAMP SCREW
LOCK LEVER RELEASE ARM
ROCKER BAIL
TOGGLE LINKAGE SHOULD MOVE THROUGH A POINT WHERE TOGGLE LINK AND LOCK LEVER ARE IN A STRAIGHT LINE WITHOUT RAISING LIFTER
A. REAR VIEW
NO. 5 PULSE BEAM
NO. 5 PULSE BEAM SPRING
10 TO 15 OZ TO PULL SPRING TO 7/16" LENGTH
7/16 INCH
B. TOP VIEW
TM5815-263-35-214

Figure 292. Perforator and transfer mechanism.

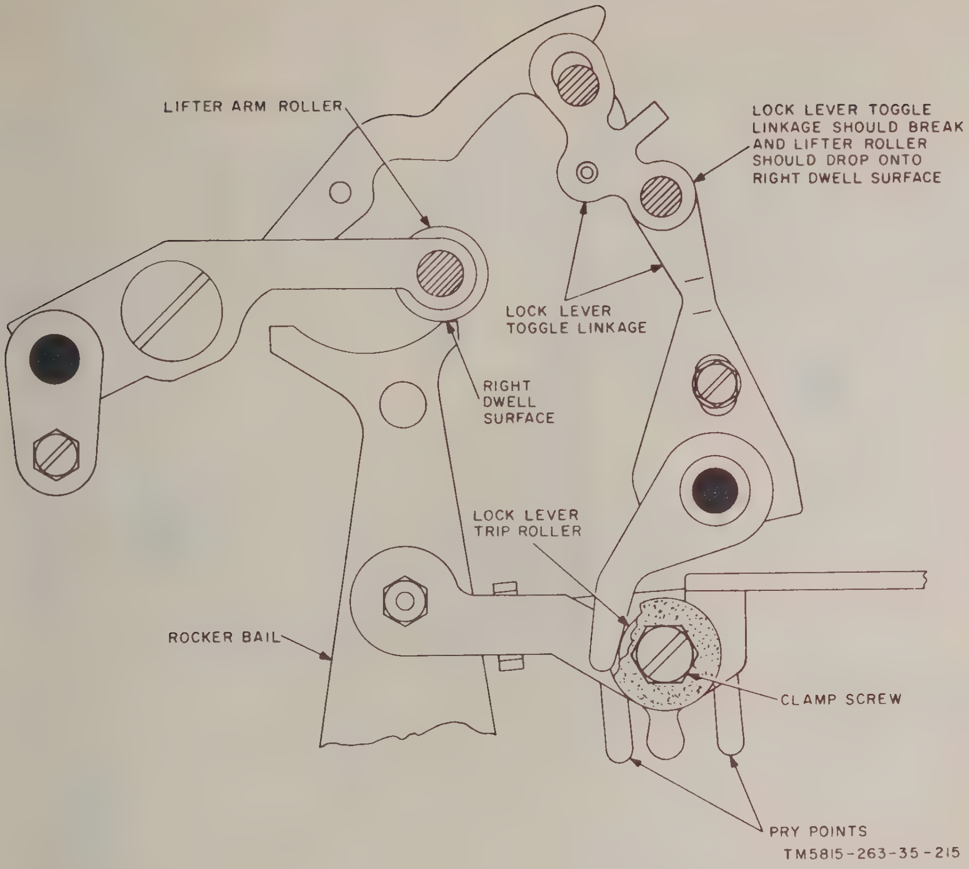

LIFTER ARM ROLLER
LOCK LEVER TOGGLE LINKAGE SHOULD BREAK AND LIFTER ROLLER SHOULD DROP ONTO RIGHT DWELL SURFACE
LOCK LEVER TOGGLE LINKAGE
RIGHT DWELL SURFACE
LOCK LEVER TRIP ROLLER
ROCKER BAIL
CLAMP SCREW
PRY POINTS
TM5815-263-35-215

Figure 293. Function box mechanism, rear view.

422. Lifter Spring Tension
(A, fig. 294)

a. Requirement. With the function clutch disengaged, it should require 7 to 9 ounces to pull the lifter spring to its installed length.

b. Method of Checking. Unhook the lifter spring from its spring post. Hook a 32-ounce scale in the spring loop and pull to installed length.

c. Adjustment. Replace the lifter spring if it fails to meet the requirement.

423. Correcting Drive Link Spring Tension
(B, fig. 294)

a. Requirement. With the function clutch disengaged, it should require 5 to 9 ounces to start the correcting drive link moving.

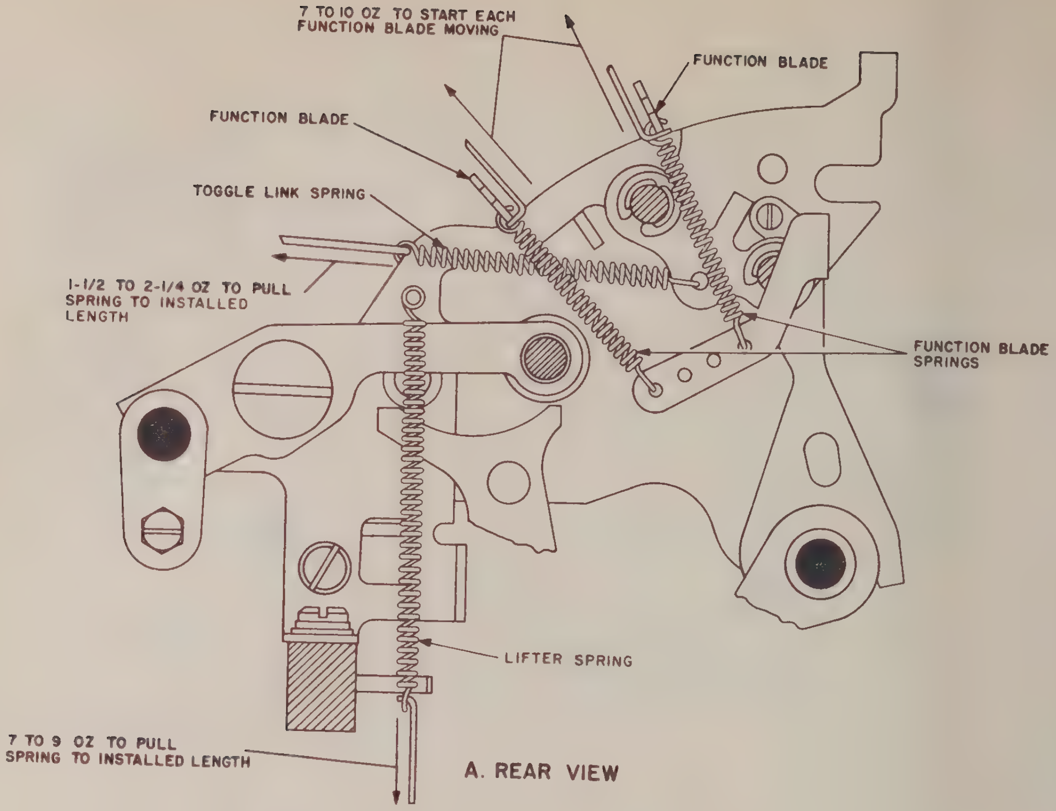
b. Method of Checking. Hook a 32-ounce scale over the top left end of the correcting drive link and pull toward the left.

c. Adjustment. Replace the correcting drive link spring if it fails to meet the requirement.

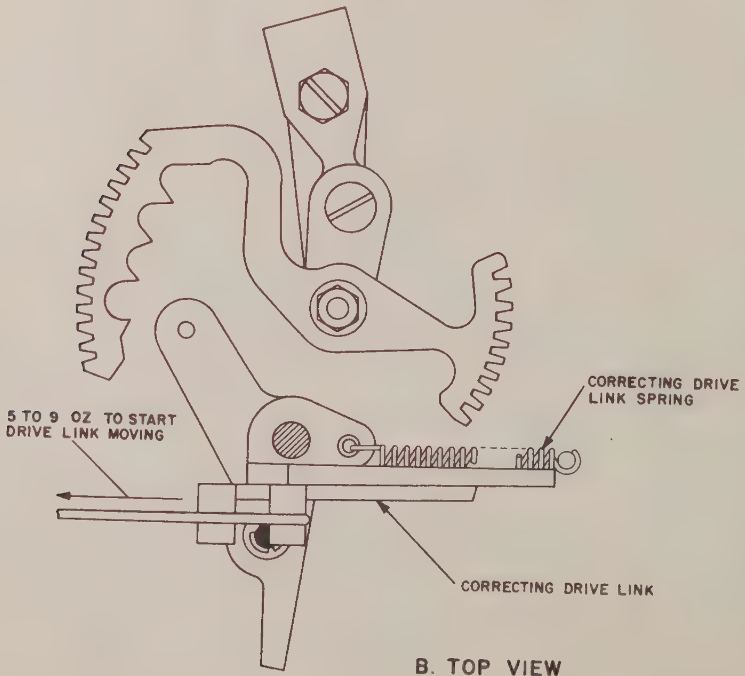
424. Oscillating Drive Link Adjustment
(fig. 295)

a. Requirement. With the function clutch tripped, and the main shaft rotated until the rocker bail is in its extreme left position, the sector mounting stud, toggle pivot screw, and oscillating drive bail screw should line up approximately in a straight line.

b. Adjustment. Loosen the locknut on the eccentric bushing to friction tightness. Position the oscillating drive link by means of its


7 TO 10 OZ TO START EACH FUNCTION BLADE MOVING
FUNCTION BLADE
FUNCTION BLADE
TOGGLE LINK SPRING
1-1/2 TO 2-1/4 OZ TO PULL SPRING TO INSTALLED LENGTH
FUNCTION BLADE SPRINGS
LIFTER SPRING
7 TO 9 OZ TO PULL SPRING TO INSTALLED LENGTH

A. REAR VIEW


CORRECTING DRIVE LINK SPRING
5 TO 9 OZ TO START DRIVE LINK MOVING
CORRECTING DRIVE LINK

B. TOP VIEW

TM5815-263-35-216

Figure 294. Function box and correcting mechanism.

eccentric bushing to obtain the requirement; tighten the locknut. Check the related adjustments given in paragraphs 419 and 433.

425. Oscillating Drive Bail Adjustment (fig. 295)

a. Requirement. With the blank code combination selected, and the main shaft rotated until the rocker bail is in its extreme left position, the following requirements should be met.

(1) The roller on the axial correcting plate should seat firmly in the center of the first notch of the axial sector.

(2) The oscillating drive bail should be loose and in a position corresponding to that of the axial correcting plate.

b. Adjustment. Loosen the oscillating drive bail mounting screw. Position the correcting drive link to obtain the requirements given in *a*(1) and (2) above. Observe that the roller fits snugly and rides centralized in the notch, with both sides in the notch touching the roller; tighten the mounting screw.

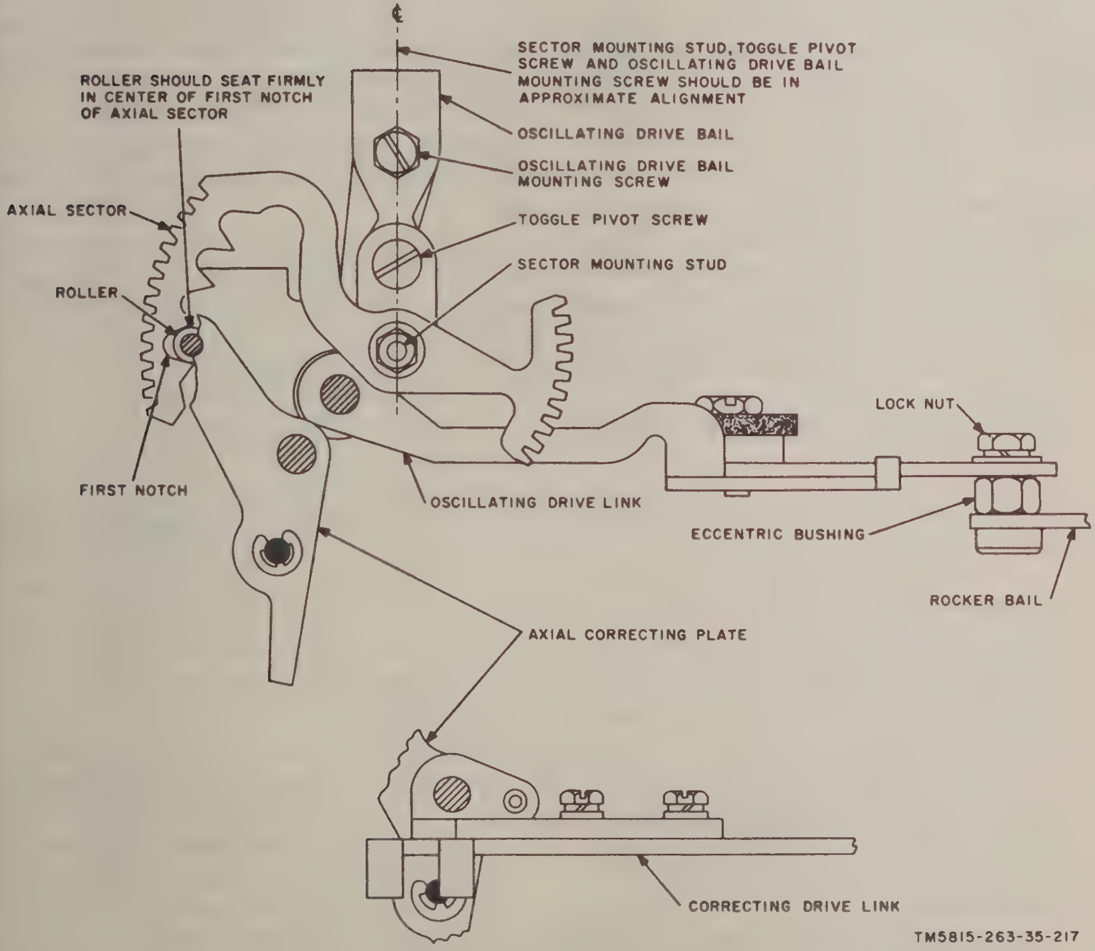

℄
SECTOR MOUNTING STUD, TOGGLE PIVOT SCREW AND OSCILLATING DRIVE BAIL MOUNTING SCREW SHOULD BE IN APPROXIMATE ALIGNMENT
ROLLER SHOULD SEAT FIRMLY IN CENTER OF FIRST NOTCH OF AXIAL SECTOR
OSCILLATING DRIVE BAIL
OSCILLATING DRIVE BAIL MOUNTING SCREW
AXIAL SECTOR
TOGGLE PIVOT SCREW
SECTOR MOUNTING STUD
ROLLER
LOCK NUT
FIRST NOTCH
OSCILLATING DRIVE LINK
ECCENTRIC BUSHING
ROCKER BAIL
AXIAL CORRECTING PLATE
CORRECTING DRIVE LINK
TM5815-263-35-217

Figure 295. Axial positioning mechanism, top view.

426. Axial Sector Alignment Adjustment
(fig. 296)

a. Requirements.

(1) The teeth of the axial sector and the axial output rack should engage by their full thickness (B).

(2) The guide roller should be free to rotate.

b. Adjustment. Loosen the mounting stud locknut. Move the assembled mounting stud to the right and disengage the axial output rack from the guide roller. Remove the retaining ring, shim, felt washer, and roller. Add or remove shims, as required, to obtain the requirement. Replace the roller, felt washer, shim and retaining ring. Place extra shims under the shim used to retain the felt washer. Engage the axial output rack with the guide roller. Move the assembly to the left until the teeth (A) on the axial sector and the output rack mesh without binding; tighten the locknut (B).

***Caution:* The last tooth on the output rack should mesh with the last tooth space on the axial sector. Misalignment of the mesh by as little as one tooth will produce a jam and cause parts breakage if the equipment is put under power while this condition exists.**

427. Eccentric Shaft Detent Lever Spring Tension
(C, fig. 296)

Note. There are two detent lever springs on the axial positioning mechanism and four on the rotary positioning mechanism.

a. Requirement. It should require 7 to 10 ounces to start the detent lever moving.

b. Method of Checking. Hook a 32-ounce scale in the spring hole detent lever and pull to the right. Measure the tension of six detent lever springs.

c. Adjustment. Replace any detent lever spring that fails to meet the requirement.

428. Axial Output Rack Guide Roller Adjustment
(A, fig. 297)

a. Requirement. With the line feed code combination selected and the main shaft rotated until the eccentric has rotated 90°, there should be .001- to .007-inch clearance between the output rack and guide roller when play is taken up to make the clearance a maximum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjusting. Loosen the locknut which secures the guide roller mounting stud. Position the mounting stud to obtain the requirement; tighten the locknut.

429. Push Bar Guide Bracket Adjustment
(B, fig. 297)

a. Requirement. With the carriage return code combination selected and the main shaft rotated until the No. 4 push bar has moved through its complete range of travel, there should be .001- to .008-inch clearance between the push bar and guide bracket throughout the complete travel of the bar when play is taken up to make the clearance a maximum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the mounting screws on the guide bracket. Position the guide bracket to obtain the requirement; tighten the mounting screws.

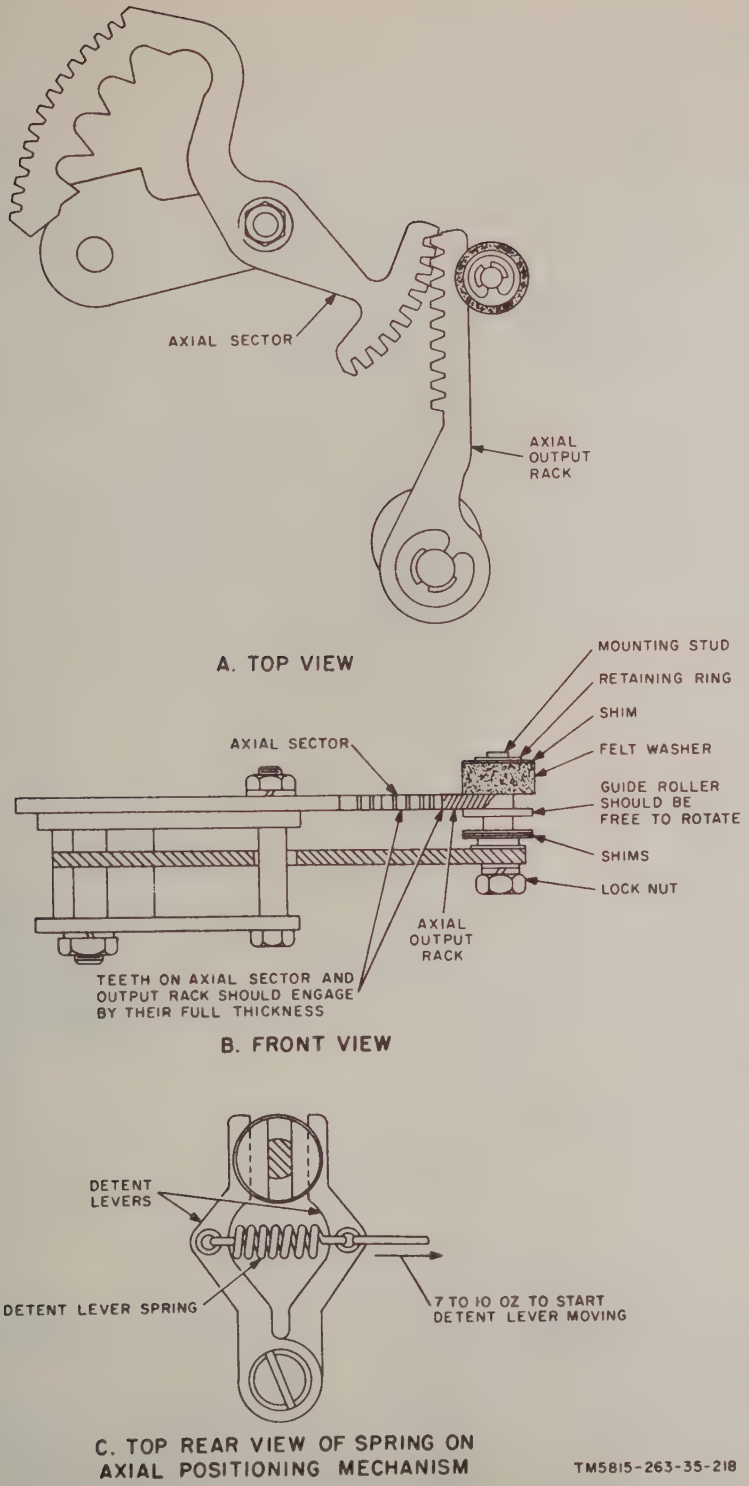
430. Correcting Drive Link Adjustment
(A, fig. 298)

a. Requirements.

(1) With the blank code combination selected and the function clutch tripped, and the main shaft rotated until the rocker bail is in its extreme left position, the roller on the axial correcting plate should be firmly seated in the first notch of the axial sector.

(2) With the letters combination selected, and the function clutch tripped, and the main shaft rotated until the rocker bail is in its extreme left position, the roller on the correcting plate should be firmly seated in the fourth notch of the axial sector.

b. Adjustment. With the blank code combination set up and the rocker bail in its extreme left position, loosen the adjusting screws

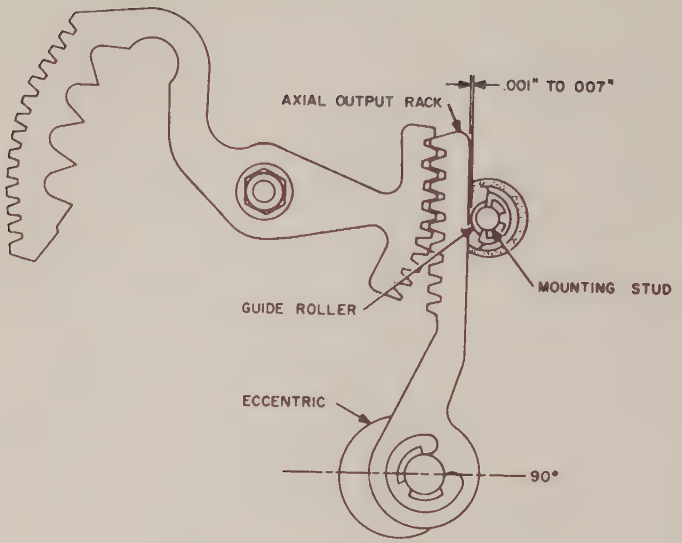

AXIAL SECTOR
AXIAL OUTPUT RACK
MOUNTING STUD
RETAINING RING
SHIM
FELT WASHER
AXIAL SECTOR
GUIDE ROLLER SHOULD BE FREE TO ROTATE
SHIMS
LOCK NUT
AXIAL OUTPUT RACK
TEETH ON AXIAL SECTOR AND OUTPUT RACK SHOULD ENGAGE BY THEIR FULL THICKNESS
DETENT LEVERS
DETENT LEVER SPRING
7 TO 10 OZ TO START DETENT LEVER MOVING
TM5815-263-35-218

A. TOP VIEW

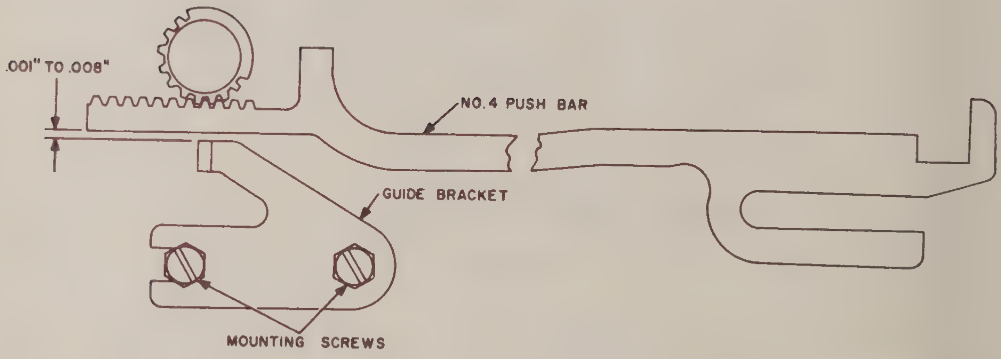
B. FRONT VIEW

C. TOP REAR VIEW OF SPRING ON AXIAL POSITIONING MECHANISM

Figure 296. Axial positioning mechanism.


.001" TO 007"
AXIAL OUTPUT RACK
MOUNTING STUD
GUIDE ROLLER
ECCENTRIC
90°

A. TOP VIEW


.001" TO .008"
NO. 4 PUSH BAR
GUIDE BRACKET
MOUNTING SCREWS

B. FRONT VIEW

TM 5815-263-35-219

Figure 297. Axial and rotary positioning mechanism.

on the correcting drive link. Hold the roller firmly seated in the first notch and apply pressure on the drive link so that the slot in the correcting drive link is bottomed against the shoulder spacer on the rocker bail. While maintaining pressure at these two points, tighten the adjusting screws. Recheck the requirements given in *a*(1) and (2) above. Check the related adjustment given in paragraph 432.

431. Idler Gear Eccentric Shaft Adjustment
(fig. 298)

a. Requirement. With the perforator in the letters condition and the function clutch disengaged, there should be .001- to .015-inch clearance between the typewheel rack tooth space and the idler gear tooth (B).

b. Method of Checking. Measure the clear-

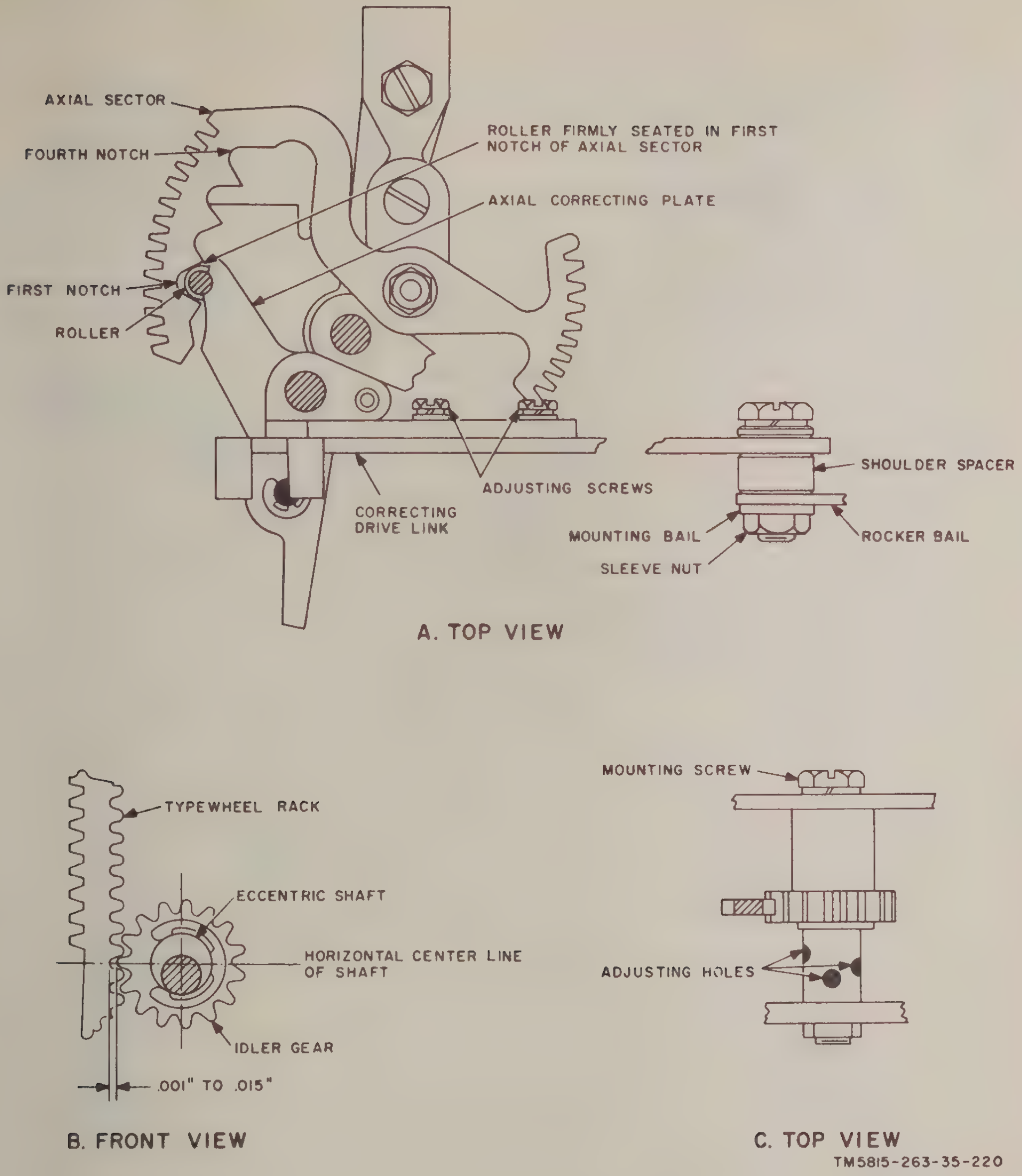

AXIAL SECTOR
FOURTH NOTCH
ROLLER FIRMLY SEATED IN FIRST NOTCH OF AXIAL SECTOR
AXIAL CORRECTING PLATE
FIRST NOTCH
ROLLER
SHOULDER SPACER
ADJUSTING SCREWS
CORRECTING DRIVE LINK
MOUNTING BAIL
ROCKER BAIL
SLEEVE NUT
A. TOP VIEW
MOUNTING SCREW
TYPEWHEEL RACK
ECCENTRIC SHAFT
HORIZONTAL CENTER LINE OF SHAFT
ADJUSTING HOLES
IDLER GEAR
.001" TO .015"
B. FRONT VIEW
C. TOP VIEW
TM5815-263-35-220

Figure 298. Correcting mechanism.

ance at the tooth that is on the horizontal centerline of the gear shaft with a round wire gage.

c. Adjustment. Loosen the eccentric shaft mounting screw (C). Position the eccentric shaft by means of three adjusting holes to obtain the requirement; tighten the mounting screw. Check the typewheel rack throughout its travel for binds.

432. Rotary Correcting Lever Adjustment

a. Requirements.

(1) When the perforator unit is in the figures condition and the figure 9 code

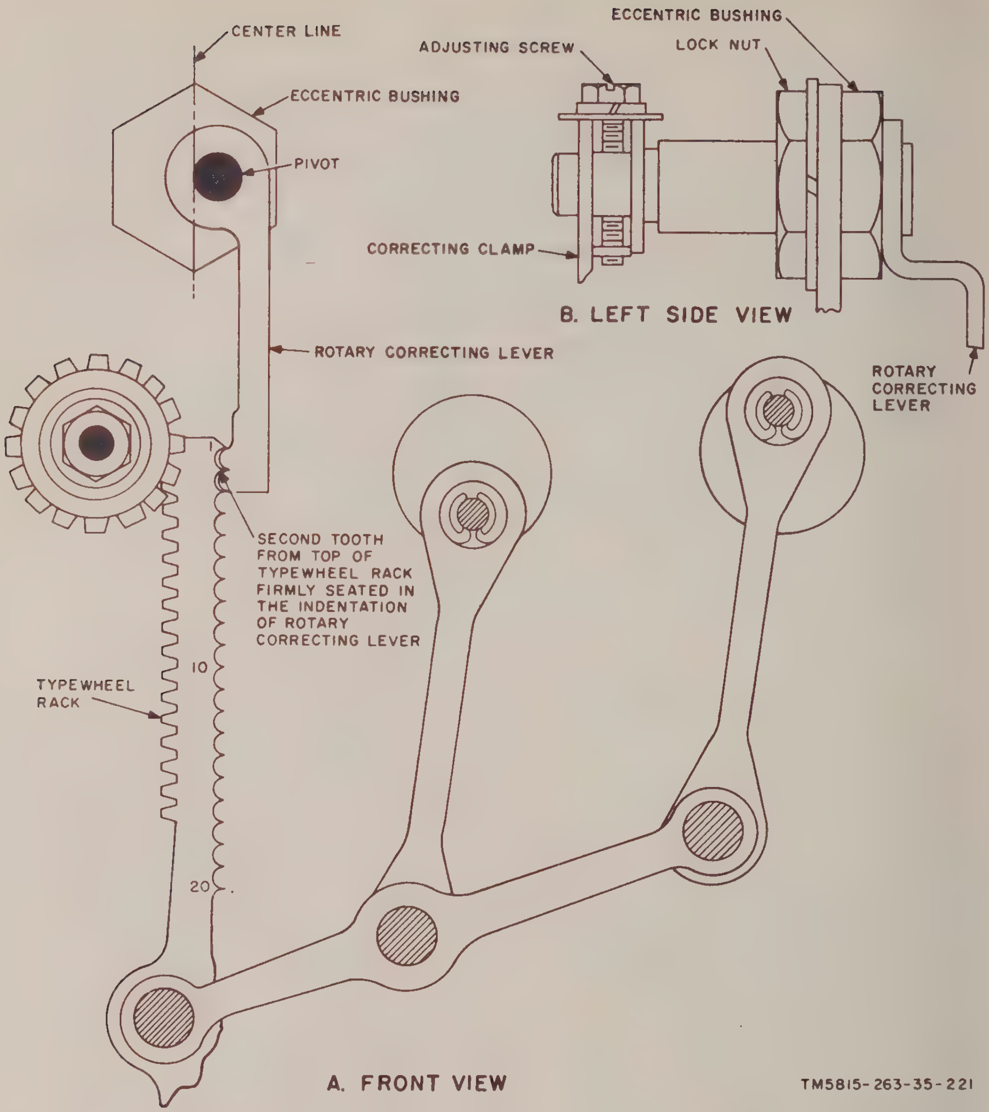

CENTER LINE
ECCENTRIC BUSHING
PIVOT
ROTARY CORRECTING LEVER
SECOND TOOTH FROM TOP OF TYPEWHEEL RACK FIRMLY SEATED IN THE INDENTATION OF ROTARY CORRECTING LEVER
TYPEWHEEL RACK
10
20
A. FRONT VIEW
ECCENTRIC BUSHING
ADJUSTING SCREW
LOCK NUT
CORRECTING CLAMP
B. LEFT SIDE VIEW
ROTARY CORRECTING LEVER
TM5815-263-35-221

Figure 299. Correcting mechanism.

combination (No. 4 and 5 marking impulses) is selected, the second tooth from the top of the typewheel rack (A, fig. 299) should be firmly in the indentation of the rotary correcting lever; when the function clutch is tripped and the main shaft rotated until the rocker bail is in its extreme left position.

(2) In a manner similar to that described in (1) above, check the engagement of the following teeth on the typewheel rack and the indentation of the rotary correcting lever:

(*a*) Fifth tooth when the symbol (,) comma code combination (No. 3 and 4 marking pulses) is selected in the figures condition.

(*b*) Ninth tooth when the carriage return combination (No. 4 marking impulse) is selected in the letters condition.

(*c*) Sixteenth tooth when the character H code combination (No. 3 and 5 marking impulses) is selected in the letters condition.

(3) When the letters code combination (No. 1 through 5 marking impulses) is selected in the letters condition and rocker bail has moved to its extreme left position, the following requirements should be met:

(*a*) The indentation of the rotary correcting lever (B, fig. 300) should be firmly seated in the typewheel rack.

(*b*) There should be .001- to .006-inch play, between the correcting clamp (A, fig. 300) and the eccentric bushing.

b. Adjustments.

(1) Loosen the ececntric bushing locknut (B, fig. 299). With the correcting clamp adjusting screw loosened, and the rotary correcting lever pivot to the right of the centerline, rotate the eccentric bushing and position the correcting lever to obtain the requirement given in *a*(1) above. Tighten the eccentric bushing locknut, but do not tighten the correcting clamp adjusting screw at this time.

(2) Refine the adjustment given in (1) above, if necessary, to obtain the requirements given in *a*(2) (*a*) through (*c*) above.

(3) With the correcting clamp adjusting screw loosened, trip the function clutch and rotate the main shaft until the roller (C, fig. 300) on the axial correcting plate approaches the seated position in the notch of the axial sector. When the clearance between the roller and sector is .001- to .005-inch, position the rotary correcting lever finger tight against the typewheel rack to obtain the requirements given in *a*(3) (*a*) and (*b*) above; tighten the correcting clamp adjusting screw.

433. Ribbon Guide Adjustment
(fig. 301)

a. Requirements.

(1) With the function clutch disengaged, the ribbon should overlap the tape by a small amount.

(2) The last printed character should be visible.

b. Adjustment. Loosen the lock screw and position the ribbon oscillating lever by means of the adjusting slot; tighten the lock screw.

434. Printing Trip Link Adjustment
(fig. 302)

a. Requirement. With the function clutch tripped and the main shaft rotated until the rocker bail is in its extreme left position, there should be .005- to .015-inch clearance between the accelerator (A) and printing latch when the accelerator is manually lifted until the latching surfaces are even.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the locknut on the printing trip link. Rotate the eccentric mounting screw and position the printing trip link to obtain the requirement. Keep the high part of the eccentric mounting screw (B) to the left of the centerline; tighten the locknut.

435. Accelerator Spring Tension
(A, fig. 302)

a. Requirement. With the function clutch disengaged, it should require 20 to 26 ounces to pull the accelerator spring to its installed length.

b. Method of Checking. Unhook the spring from the accelerator. Hook a 32-ounce scale in the spring loop and pull to installed length; rehook spring to accelerator.

c. Adjustment. Replace the accelerating spring if it fails to meet the requirement.

436. Print Hammer Spring Tension
(A, fig. 302)

a. Requirement. With the function clutch disengaged, it should require 1½ to 2½ ounces

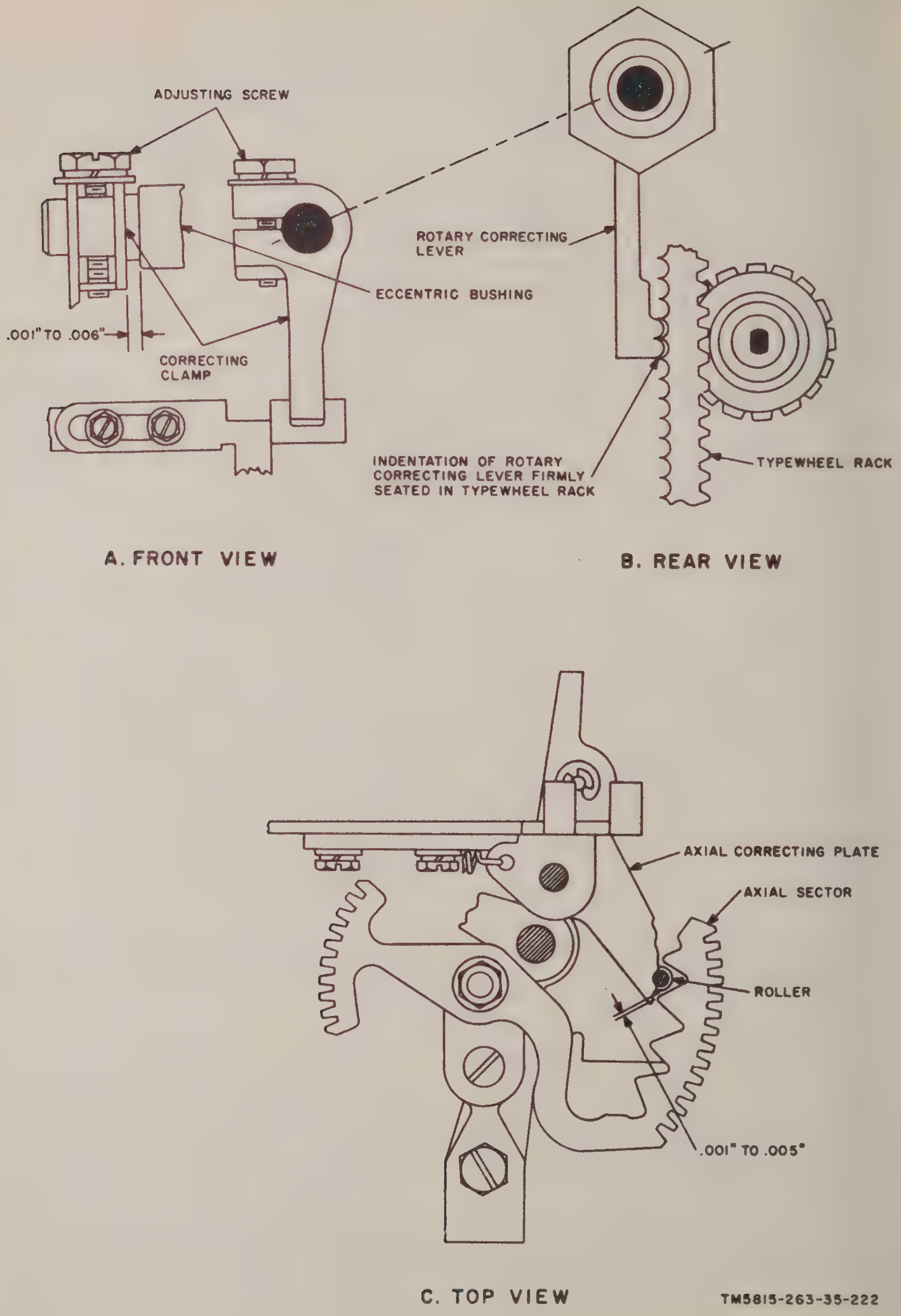

ADJUSTING SCREW
ROTARY CORRECTING LEVER
ECCENTRIC BUSHING
.001" TO .006"
CORRECTING CLAMP
INDENTATION OF ROTARY CORRECTING LEVER FIRMLY SEATED IN TYPEWHEEL RACK
TYPEWHEEL RACK
A. FRONT VIEW
B. REAR VIEW
AXIAL CORRECTING PLATE
AXIAL SECTOR
ROLLER
.001" TO .005"
C. TOP VIEW
TM5815-263-35-222

Figure 300. Correcting mechanism.

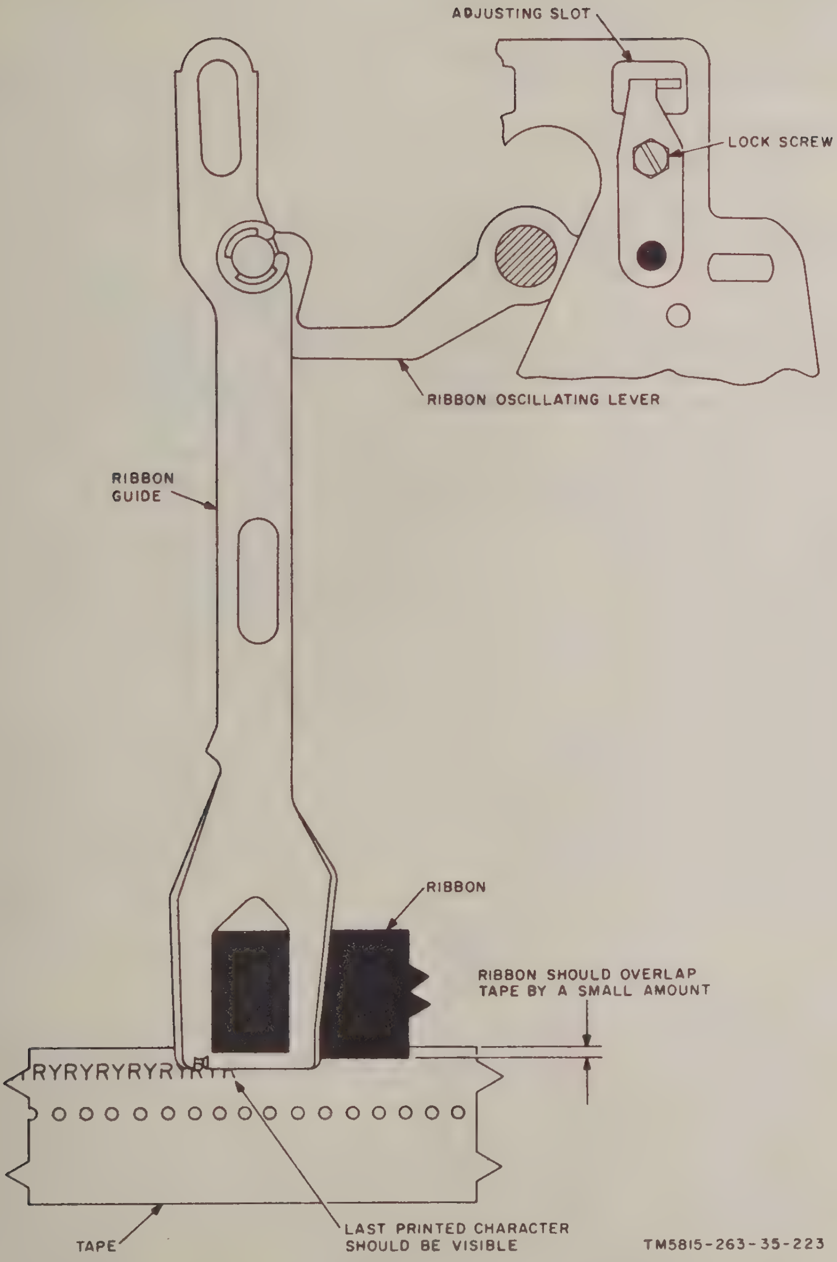

ADJUSTING SLOT
LOCK SCREW
RIBBON OSCILLATING LEVER
RIBBON GUIDE
RIBBON
RIBBON SHOULD OVERLAP TAPE BY A SMALL AMOUNT
RYRYRYRYRYRYR
TAPE
LAST PRINTED CHARACTER SHOULD BE VISIBLE
TM5815-263-35-223

Figure 301. Ribbon oscillating mechanism, top view.

to pull the print hammer spring to its installed length.

b. Method of Checking. Unhook the print hammer spring from the accelerator. Hook an 8-ounce scale in the spring loop and pull to installed length; rehook spring to accelerator.

c. Adjustment. Replace the print hammer spring if it fails to meet the requirement.

437. Printing Latch Spring Tension (A, fig. 302)

a. Requirement. With the function clutch disengaged, it should require 5 to 7 ounces to pull the printing latch spring to its installed length.

b. Method of Checking. Unhook the latch spring from its spring post. Hook an 8-ounce scale in the spring loop and pull to installed length; rehook spring to post.

c. Adjustment. Replace the printing latch spring if it fails to meet the requirement.

438. Printing Link Spring Tension (B, fig. 302)

a. Requirement. It should require 4 to 7 ounces to pull the printing trip link spring to its installed length.

b. Method of Checking. Unhook the printing trip link spring from the spring hole below the eccentric mounting screw. Hook an 8-ounce scale in the spring loop and pull to installed length; rehook spring to trip link.

c. Adjustment. Replace the printing trip link spring if it fails to meet the requirement.

439. Typewheel Adjustment

a. Requirement. With the character M code combination selected and the main shaft rotated until the rocker bail is in its extreme left position, and the rotary correcting lever (A, fig. 303) firmly seated in typewheel rack, the typewheel should be aligned so that the full character is uniformly printed.

b. Method of Checking. With tape fed into the perforator, set up the condition given in the requirement. Check printing by manually lifting up the accelerator (A, fig. 302) to its latched position and releasing it.

c. Adjustment. Loosen the locknut (A, fig. 303) on the typewheel. Position the typewheel to obtain the requirement; tighten the locknut.

Note. For best results it may be necessary to make the print hammer adjustment (par. 440) and then refine this adjustment.

440. Print Hammer Adjustment (B, fig. 303)

a. Requirement. When operating under power, the print hammer and type wheel should be so aligned as to produce the best quality of printing.

b. Adjustment. Loosen the locknut (B) on the eccentric stud. Position the eccentric stud to obtain the requirement; tighten the locknut.

Note. It may be necessary to remake the typewheel adjustment (par. 439), then refine this adjustment.

441. Ribbon Feed Pawl Spring Tension (fig. 304)

a. Requirement. With the function clutch tripped and the main shaft rotated until the rocker bail is in its extreme left position, it should require 10 to 14 ounces to pull the feed pawl spring to its installed length.

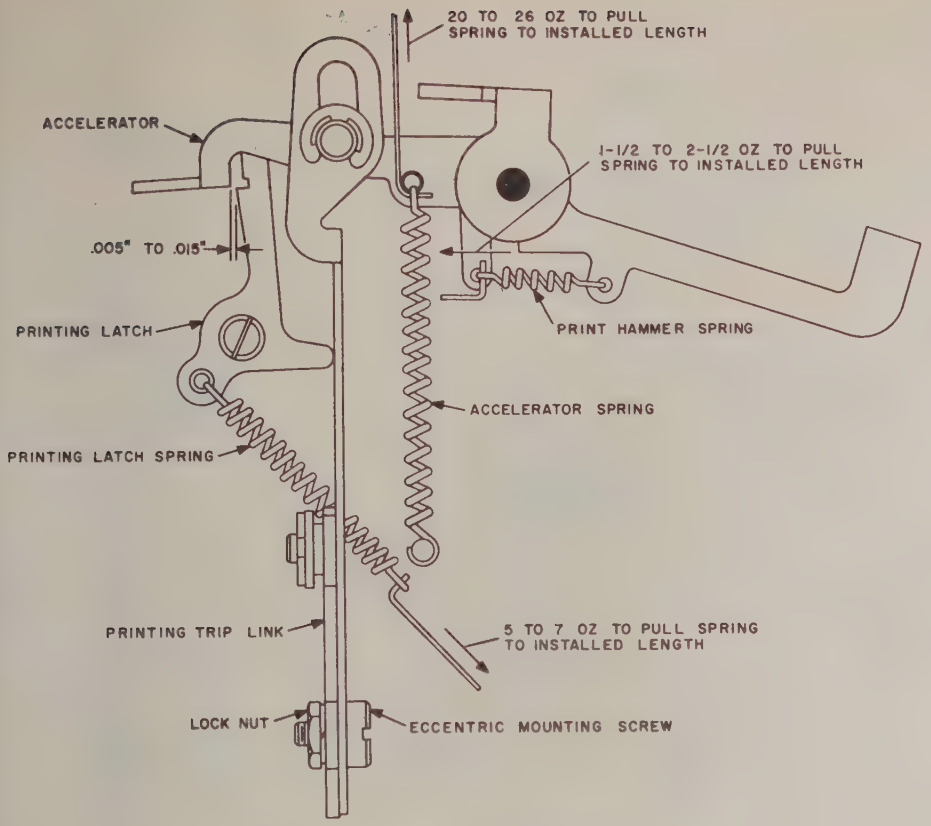
b. Method of Checking. Unhook the upper end of the feed pawl spring from the feed pawl. Hook a 32-ounce scale in the spring loop and pull spring to installed length; rehook spring on feed pawl.

c. Adjustment. Replace the feed pawl spring if it fails to meet the requirement.

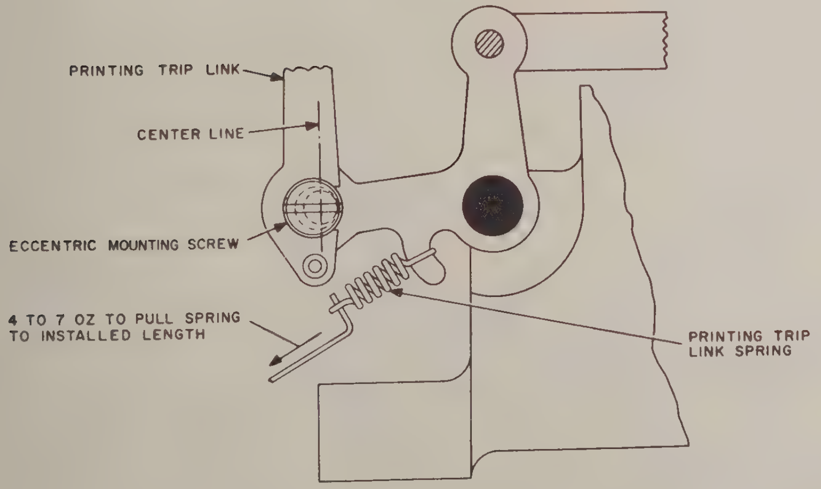
442. Ribbon Feed Adjusting Arm Adjustment (fig. 304)

a. Requirement. With the function clutch tripped and the main shaft rotated until the rocker bail is in its extreme left position, there should be .015- to .025-inch clearance between the retaining pawl and ratchet tooth on the side where the clearance is the least.

b. Method of Checking. With the feed pawl engaging the ratchet teeth, measure the clearance between the retaining pawl and ratchet tooth with a flat feeler gage. Shift the feed pawl to the opposite ratchet and measure the clearance at that side.


20 TO 26 OZ TO PULL SPRING TO INSTALLED LENGTH
ACCELERATOR
1-1/2 TO 2-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH
.005" TO .015"
PRINTING LATCH
PRINT HAMMER SPRING
ACCELERATOR SPRING
PRINTING LATCH SPRING
PRINTING TRIP LINK
5 TO 7 OZ TO PULL SPRING TO INSTALLED LENGTH
LOCK NUT
ECCENTRIC MOUNTING SCREW

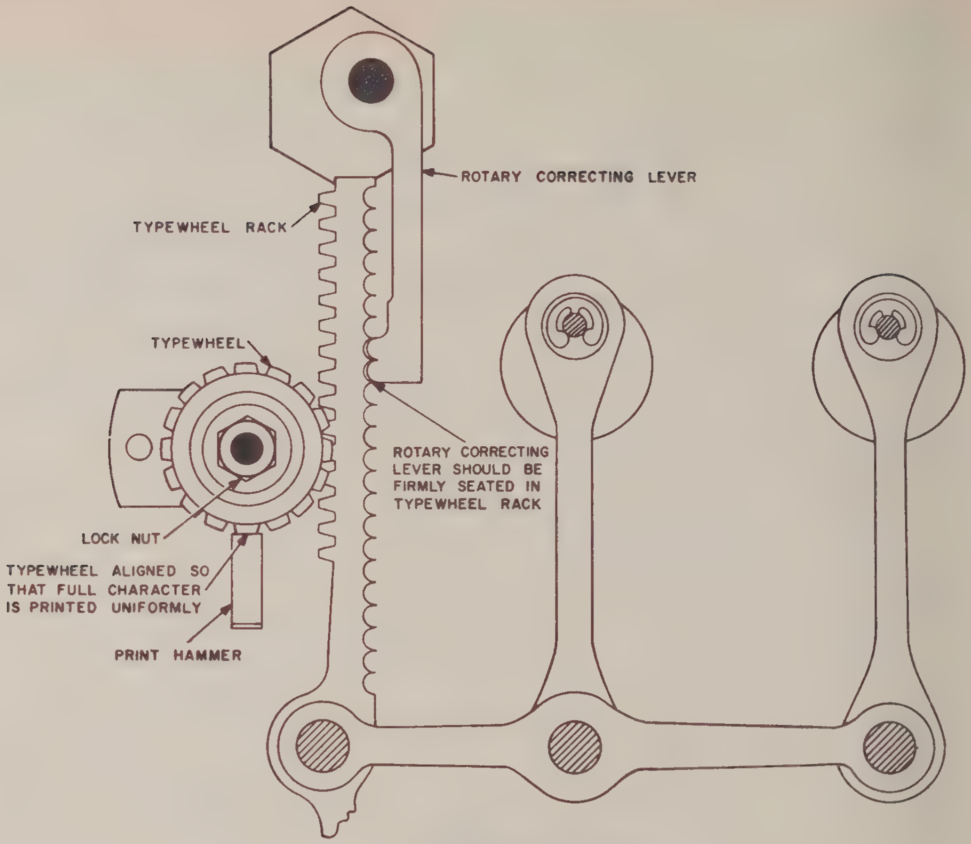
A. LEFT SIDE VIEW


PRINTING TRIP LINK
CENTER LINE
ECCENTRIC MOUNTING SCREW
4 TO 7 OZ TO PULL SPRING TO INSTALLED LENGTH
PRINTING TRIP LINK SPRING

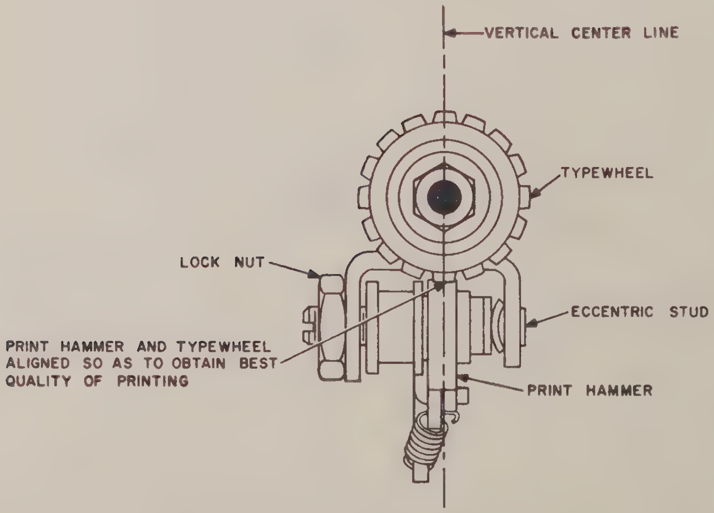
B. FRONT VIEW

TM5815-263-35-224

Figure 302. Printing mechanism.


ROTARY CORRECTING LEVER
TYPEWHEEL RACK
TYPEWHEEL
ROTARY CORRECTING LEVER SHOULD BE FIRMLY SEATED IN TYPEWHEEL RACK
LOCK NUT
TYPEWHEEL ALIGNED SO THAT FULL CHARACTER IS PRINTED UNIFORMLY
PRINT HAMMER

A. FRONT VIEW


VERTICAL CENTER LINE
TYPEWHEEL
LOCK NUT
ECCENTRIC STUD
PRINT HAMMER AND TYPEWHEEL ALIGNED SO AS TO OBTAIN BEST QUALITY OF PRINTING
PRINT HAMMER

B. FRONT VIEW

TM5815-263-35-225

Figure 303. Printing mechanism.

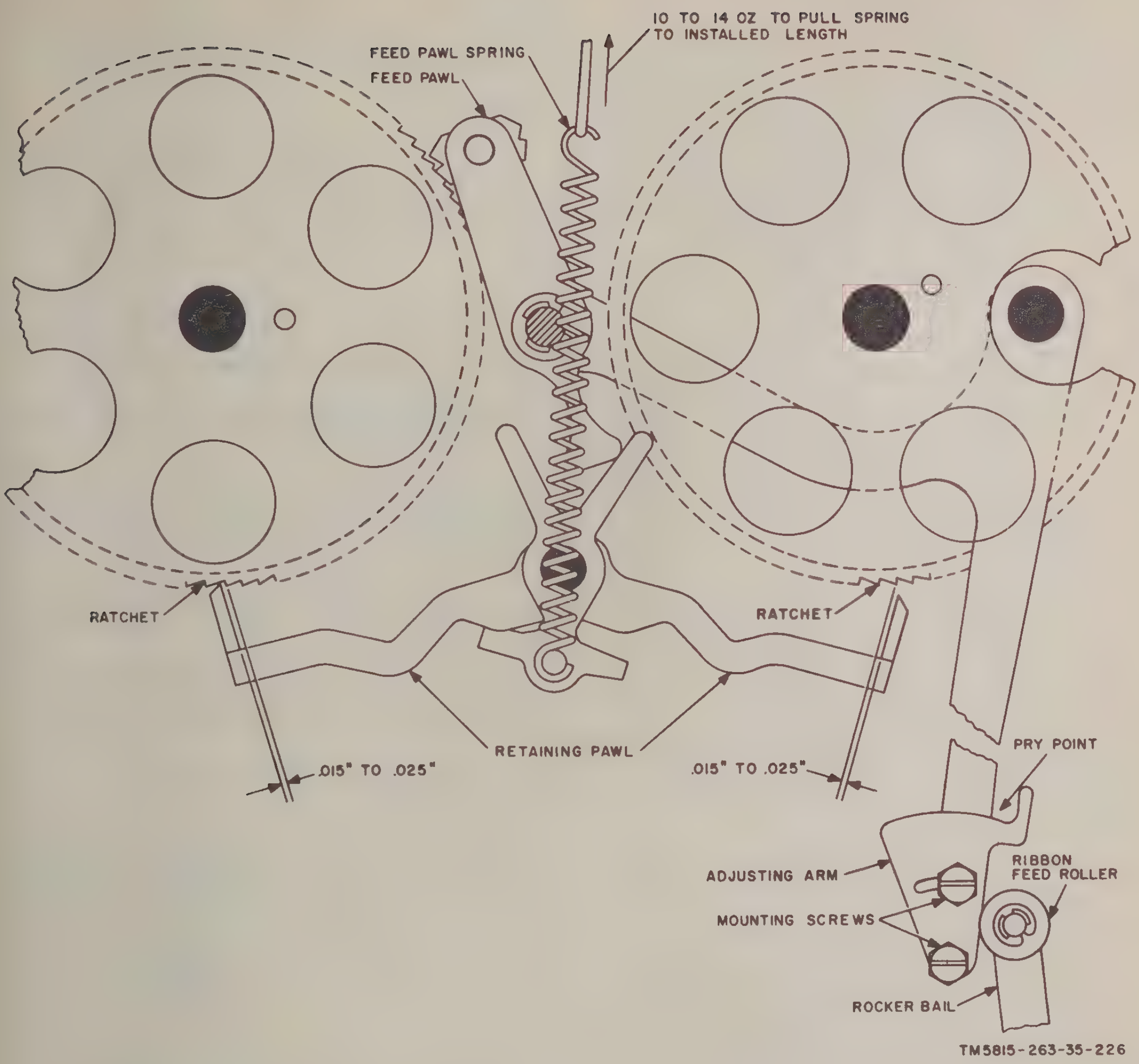

10 TO 14 OZ TO PULL SPRING TO INSTALLED LENGTH
FEED PAWL SPRING
FEED PAWL
RATCHET
RATCHET
RETAINING PAWL
.015" TO .025"
.015" TO .025"
PRY POINT
ADJUSTING ARM
RIBBON FEED ROLLER
MOUNTING SCREWS
ROCKER BAIL
TM5815-263-35-226

Figure 304. Ribbon feed mechanism, front view.

c. Adjustment. Loosen the mounting screws on the adjusting arm. Position the arm, by means of the pry point, to obtain the requirement; tighten the mounting screws.

443. Ribbon Feed Drive Arm Spring Tension (fig. 305)

a. Requirement. With the function clutch disengaged, it should require 3 to 5 ounces to pull the drive arm spring to its installed length.

b. Method of Checking. Unhook the upper end of the spring from the post on the drive arm. Hook an 8-ounce scale in the spring loop and pull to installed length; rehook spring on drive arm post.

c. Adjustment. Replace the drive arm spring if it fails to meet the requirement.

444. Ribbon Feed Pawl Downstop Eccentric Adjustment
(fig. 305)

a. Requirements.

(1) With the function clutch disengaged there should be .020- to .040-inch clearance between the feed pawl and ratchet tooth, on the side where the clearance is the least, when the backlash in the rachet wheel is taken up to make the clearance a minimum.

(2) The feed pawl should feed one tooth at a time.

b. Method of Checking.

(1) With the retaining pawl in full engagement with a tooth on the ratchet, measure the clearance given in *a*(1) above with a round wire gage. Shift the feed pawl to the opposite ratchet and measure the clearance at that side.

(2) Trip the function clutch and rotate the main shaft through one complete revolution to check the requirement given in *a*(2) above. Repeat the check several times at each ratchet.

c. Adjustment. Loosen the locknut on the downstop eccentric. Position the eccentric to obtain requirements *a*(1) and (2) above; tighten the locknut.

445. Ribbon Ratchet Wheel Spring Washer Adjustment
(fig. 305)

Note. Make this adjustment for both ratchet wheels.

a. Requirement. With the feed pawl and retaining pawl shifted to the opposite ratchet, it should require a pull of 1 to 2½ ounces to start the ratchet moving.

b. Method of Checking. Hook an 8-ounce scale on a tooth at the top of the ratchet and pull tangent to the ratchet.

c. Adjustment. Remove the retaining ring and spring washer. Bend the washer to obtain the requirement. Reinstall the spring washer and retaining ring.

446. Ribbon Reversing Plate Adjustment
(fig. 306)

a. Requirement. With the function clutch tripped and the main shaft rotated until the rocker bail is in its extreme left position, there should be .010- to .020-inch clearance between the reversing arm and reversing plate, at the reversing arm where the clearance is the least, when the reversing arm is held under the reversing plate.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler or round wire gage. Shift the feed pawl to the opposite ratchet and measure the clearance at that side.

c. Adjustment. Loosen the clamp screw on the reversing plate. Position the plate to obtain the requirement; tighten the clamp screw.

447. Ribbon Feed Reversing Arm Spring Tension
(fig. 306)

a. Requirement. With the feed pawl in its highest position, it should require a pull of 10 to 30 grams to start the reversing arm moving.

b. Method of Checking. Apply the end of a 60-gram scale over the end of the reversing arm and push downward.

c. Adjustment. Replace the reversing arm spring if it fails to meet the requirement.

448. Main Trip Lever Adjustment
(fig. 307)

a. Requirement. With the function clutch disengaged, the reset bail must be in its uppermost position when the main trip lever is .015- to .025-inch below the end of the clutch release.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the clamp screw on the reset bail trip lever. Position the main trip lever to obtain the requirement.

449. Function Clutch Release Spring Tension
(fig. 307)

a. Requirement. With the function clutch engaged, it should require 5 to 8 ounces to start the clutch release moving.

b. Method of Checking. Trip the function clutch. Slowly rotate the main shaft until the clutch release is just reset on top of the main trip lever. Hook an 8-ounce scale under the

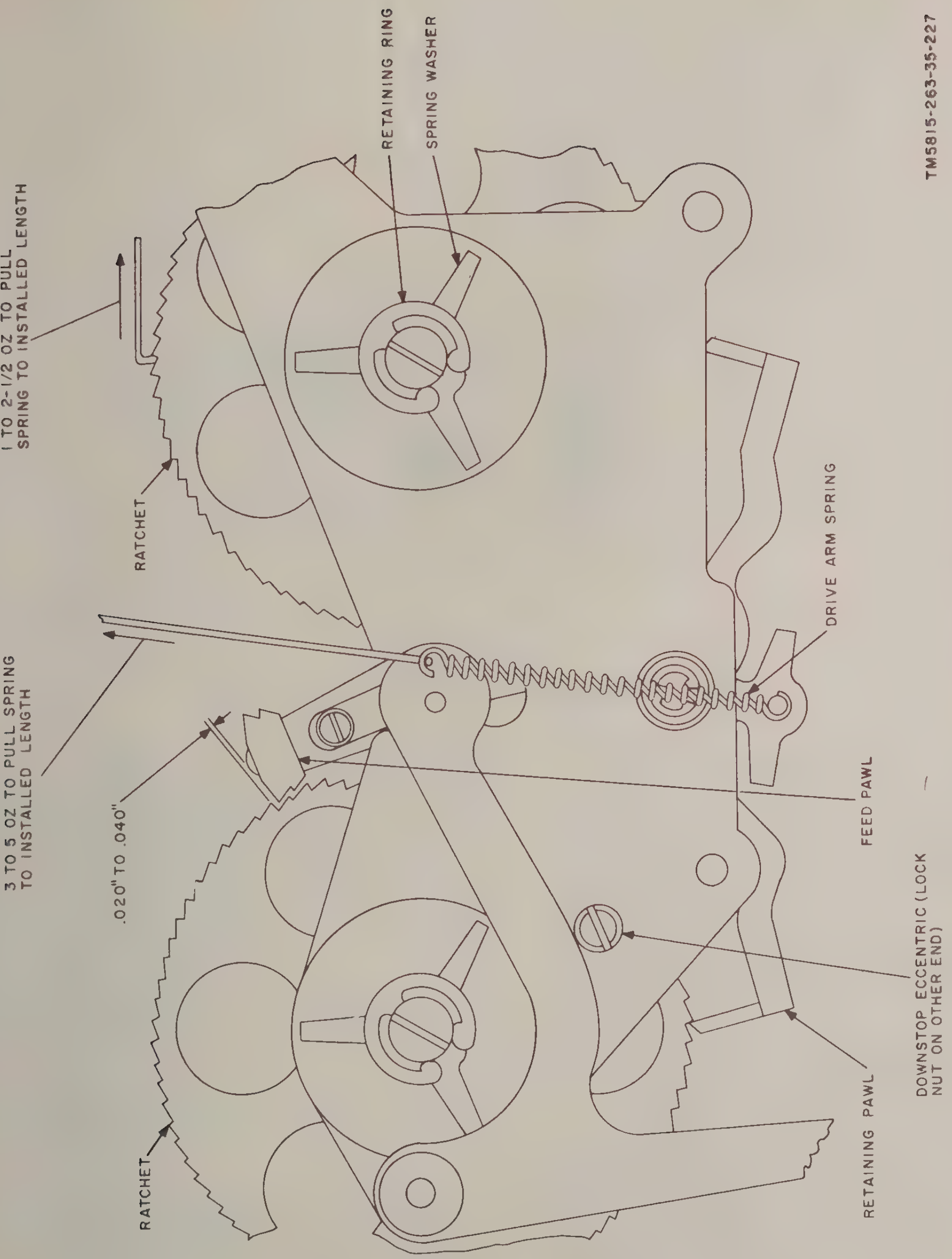

1 TO 2-1/2 OZ TO PULL SPRING TO INSTALLED LENGTH
RETAINING RING
SPRING WASHER
TM5815-263-35-227
RATCHET
3 TO 5 OZ TO PULL SPRING TO INSTALLED LENGTH
.020" TO .040"
DRIVE ARM SPRING
FEED PAWL
DOWNSTOP ECCENTRIC (LOCK NUT ON OTHER END)
RETAINING PAWL
RATCHET

Figure 305. Ribbon feed mechanism, rear view.

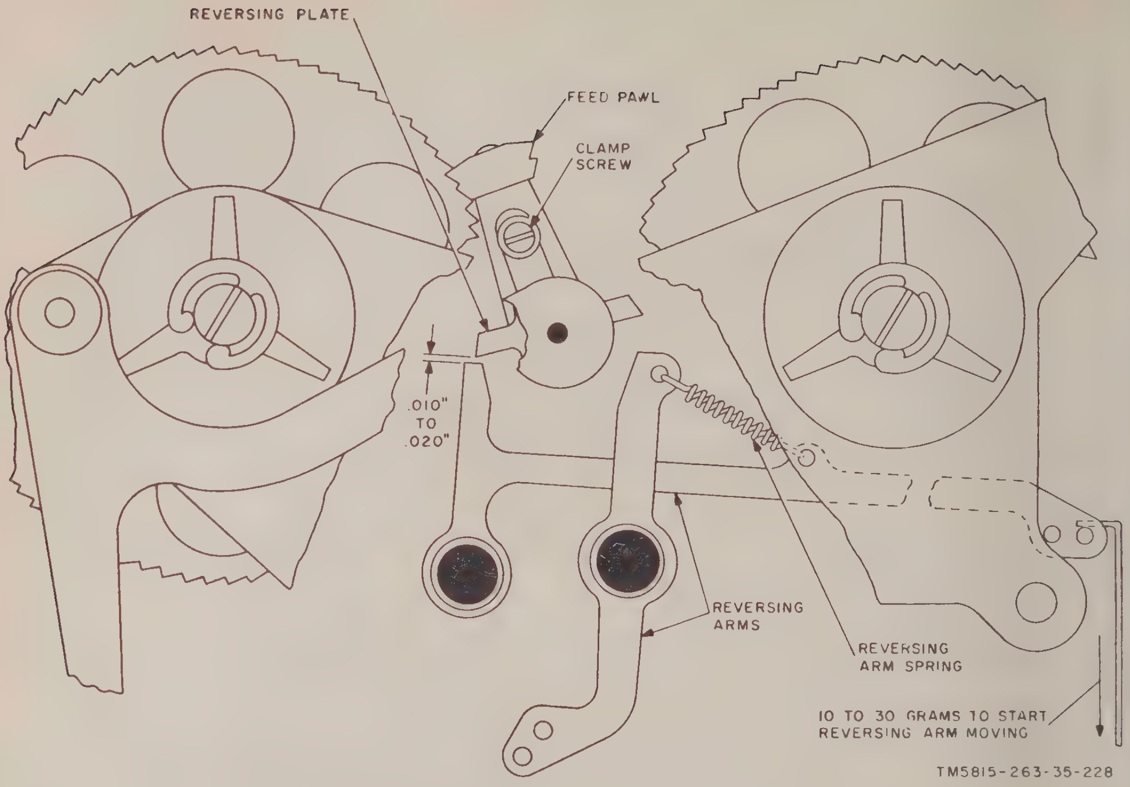


Figure 306. Ribbon feed mechanism, rear view.

face of the release and pull upward at a right angle to the release.

c. Adjustment. Replace the clutch release spring if it fails to meet the requirement.

450. Perforator Clutch Release Trip Adjustment
(fig. 308)

Note. The perforator unit must be mounted on the keyboard base (par. 81*b*), and the perforator alignment adjustment (par. 275) should be checked before proceeding with this adjustment.

a. Requirement. With power on, the perforator should trip consistently when the keyboard control knob is in the T or K–T position and the blank and repeat keylevers are depressed simultaneously. With power off and the keyboard control knob turned from the K position to the K–T position, the perforator should trip when the first keylever is depressed and there should be .015- to .025-inch clearance between the main trip lever and clutch release.

b. Adjustment. Place the keyboard control knob in the T position. Loosen the clamp screws on the trip lever latch and move the latch to the extreme left. With the code bars to the right, strike the blank keylever and move the stop bracket to the right until it disengages the latch. Move the clutch trip bar link to the right until it latches. Position the trip lever latch to the right to obtain the clearance given in the requirement; tighten the clamp screws.

c. Method of Checking. Loosen the stop bracket screws friction tight. Move the stop bracket slowly to the left until the latch just trips. Turn on the motor and depress the blank and repeat keylevers simultaneously. If the operation is satisfactory, turn the control knob

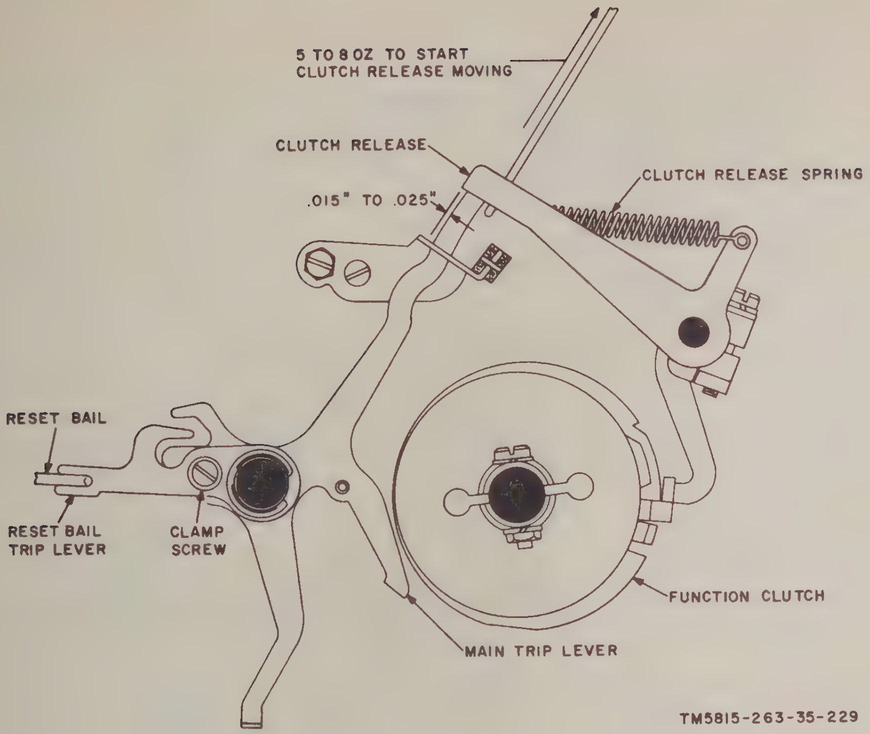

5 TO 8 OZ TO START CLUTCH RELEASE MOVING
CLUTCH RELEASE
CLUTCH RELEASE SPRING
.015" TO .025"
RESET BAIL
RESET BAIL TRIP LEVER
CLAMP SCREW
FUNCTION CLUTCH
MAIN TRIP LEVER
TM5815-263-35-229

Figure 307. Perforator trip lever mechanism, front view.

to the K–T position and repeat. Turn the keyboard control knob to the K position and back to the K–T position. Depress a keylever. The perforator clutch should trip. If the clutch trips, tighten the stop bracket screws. If it does not, move the stop bracket slightly to the right and repeat the above adjustment.

Note. Check for clearance between the reset bail and punch slides when the reset bail trip lever is tripped. Refine the above adjustment, if necessary, to obtain operational clearance.

451. Rake Shaft Adjustment
(fig. 309)

a. Requirement.

(1) The bottom surface of the rake shaft teeth (A) should be in the same vertical plane as the left side of the punch block when rotational play in the rake shaft is taken up to the left.

(2) With the bell crank spring (B) unhooked and the rake shaft in the operated position, there should be .007- to .011-inch clearance between the bottom of the rake shaft teeth (A) and the lower surface of the tape slot.

b. Method of Checking.

(1) Visually check the requirement given in *a*(1) above.

(2) Unhook the bell crank spring (B). With the function clutch disengaged, rotate the main shaft until the rake shaft (A) is in its operated position. Measure the clearance given in *a*(2) above with a flat feeler gage at the No. 1 and No. 5 punch pin.

c. Adjustments.

(1) Loosen two mounting screws from the rake shaft plate. Position the rake shaft gear in relation to the segment gear to obtain the requirement given

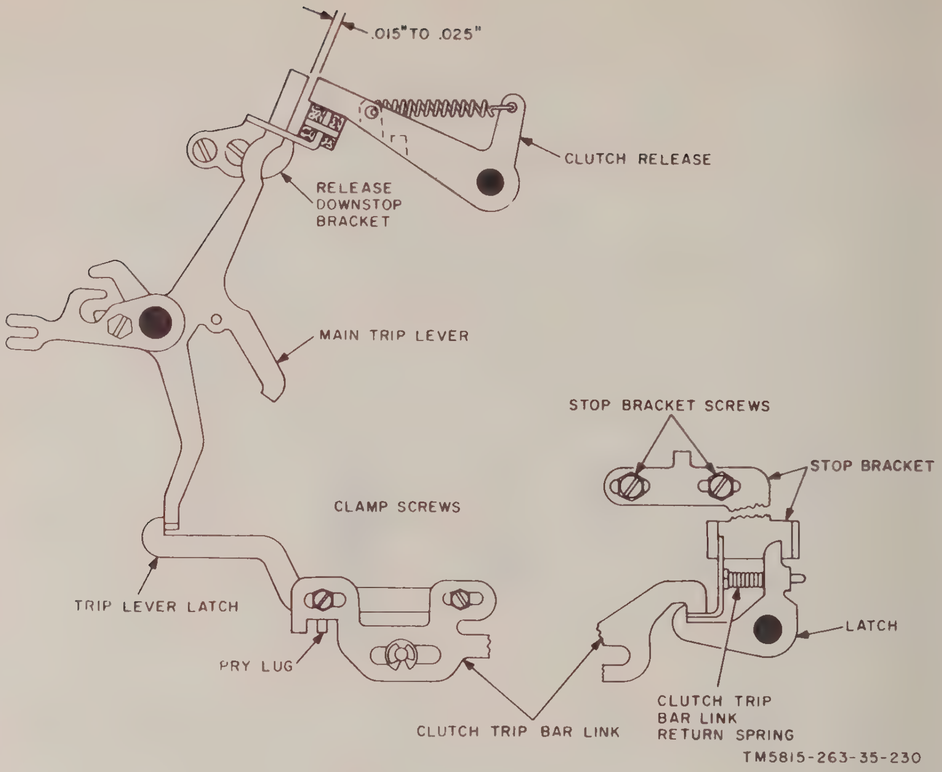

.015" TO .025"
CLUTCH RELEASE
RELEASE DOWNSTOP BRACKET
MAIN TRIP LEVER
STOP BRACKET SCREWS
STOP BRACKET
CLAMP SCREWS
TRIP LEVER LATCH
LATCH
PRY LUG
CLUTCH TRIP BAR LINK
CLUTCH TRIP BAR LINK RETURN SPRING
TM5815-263-35-230

Figure 308. Perforator clutch release mechanism, front view.

in *a*(1) above. Tighten the mounting screws.

(2) Loosen four mounting screws until friction tight. Position the front and rear plates, with the bell crank handle (B) fully depressed, until the left edges of both plates (A) are approximately in line with the vertical plane of the punch block and the clearance meets the requirement given in *a*(2) above. Tighten the mounting screws and rehook the bell crank spring. Check the related adjustments given in paragraphs 452 and 453.

452. Feed Pawl Adjusting Plate Adjustment
(B, fig. 309)

a. Requirements.

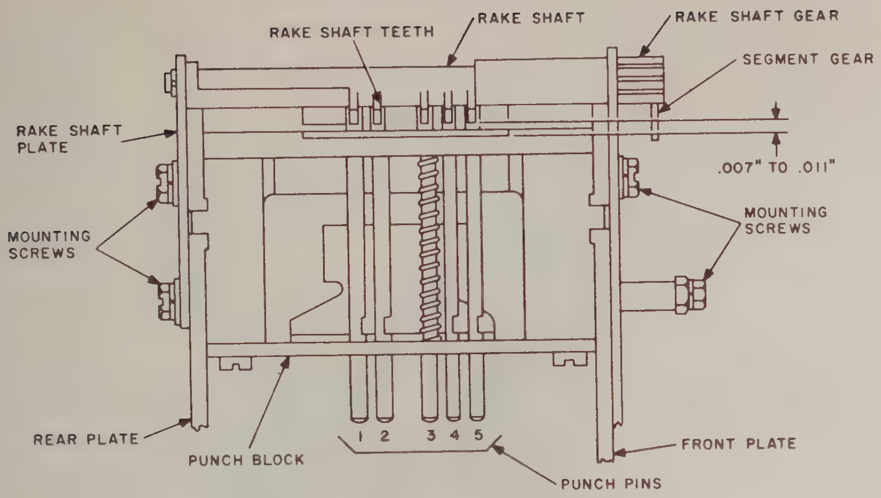
(1) *Preliminary.* When the bell crank is rotated clockwise, there should be .006- to .040-inch clearance between the backspace feed pawl and the first tooth of the feed wheel ratchet.

(2) *Final.* When the bell crank is rotated clockwise the backspace feed pawl shall miss the first tooth and engage the second tooth by at least one-half of the right engaging surface of the backspace feed pawl (as gaged by eye) when the backspace feed pawl first contacts the second ratchet tooth.

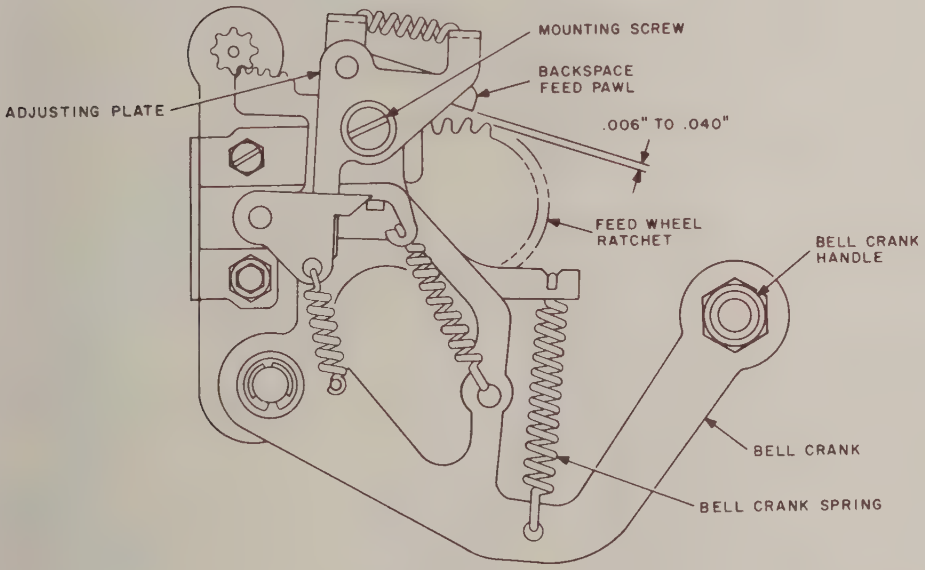
b. Method of Checking.

(1) Rotate the bell crank until the leading edge of the backspace feed pawl is just over the first ratchet tooth. Measure the clearance, *a*(1) above with a round wire gage.

(2) Rotate the bell crank until the backspace feed pawl just contacts the second ratchet tooth. Visually check the requirement *a*(2) above.


RAKE SHAFT TEETH
RAKE SHAFT
RAKE SHAFT GEAR
SEGMENT GEAR
RAKE SHAFT PLATE
.007" TO .011"
MOUNTING SCREWS
MOUNTING SCREWS
REAR PLATE
PUNCH BLOCK
1 2 3 4 5
FRONT PLATE
PUNCH PINS

A. LEFT SIDE VIEW


MOUNTING SCREW
BACKSPACE FEED PAWL
ADJUSTING PLATE
.006" TO .040"
FEED WHEEL RATCHET
BELL CRANK HANDLE
BELL CRANK
BELL CRANK SPRING

B. FRONT VIEW

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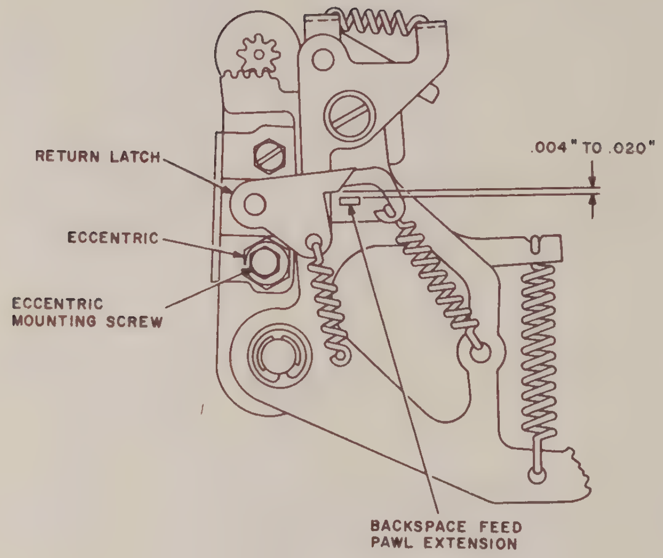
Figure 309. Manual backspace mechanism.

c. Adjustment. Loosen the mounting screws on the adjusting plate to friction tightness. Position the plate to obtain the requirements; tighten the mounting screw. Check the related adjustment given in paragraph 453.

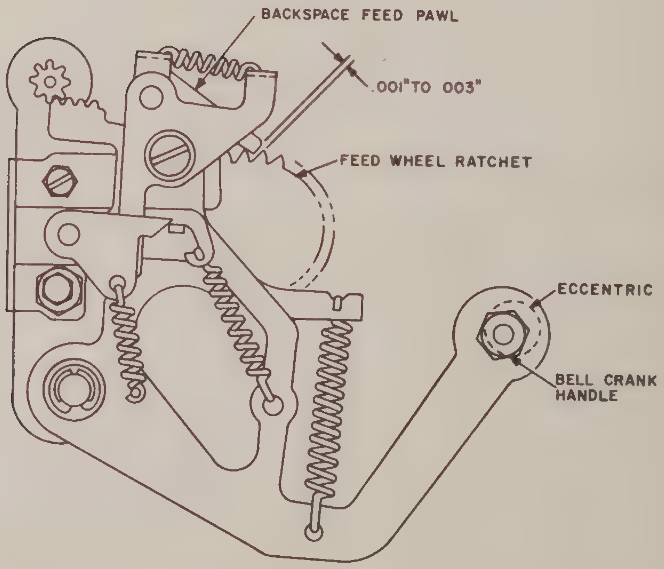
453. Return Latch Adjustment

(A, fig. 310)

a. Requirement. With the backspace mechanism in the unoperated position, there should be .004- to .020-inch clearance between the re-


RETURN LATCH
.004" TO .020"
ECCENTRIC
ECCENTRIC MOUNTING SCREW
BACKSPACE FEED PAWL EXTENSION

A. FRONT VIEW


BACKSPACE FEED PAWL
.001"TO 003"
FEED WHEEL RATCHET
ECCENTRIC
BELL CRANK HANDLE

B. FRONT VIEW

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Figure 310. Manual backspace mechanism.

turn latch and the backspace feed pawl extension.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler or round wire gage.

c. Adjustment. Loosen the eccentric mounting screw friction tight. Adjust the eccentric to obtain the requirement; tighten the mounting screw. Check the related adjustment given in paragraph 452.

454. Backspace Feed Pawl Adjustment (Preliminary)

(B, fig. 310)

a. Requirement. With the backspace mechanism in the operated position and the feed wheel ratchet in the detented position, there should be .001- to .003-inch clearance between the ratchet tooth and the backspace feed pawl.

b. Adjustment. Loosen the bell crank handle to friction tightness. Rotate the eccentric with a .060-inch allen wrench to obtain the requirement; tighten the bell crank handle.

455. Armature Hinge Adjustment

a. Requirement. With the armature bail spring (fig. 315) unhooked and the armature (A, fig. 311) held against the pole face, there should be .001- to .004-inch clearance between the armature and mounting bracket when play is taken up to make the clearance a minimum.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the hinge mounting screws and position the hinge to obtain the requirement. The armature should touch the front and rear of the pole face while the adjustment is being made. Tighten the mounting screws and recheck the requirement. Rehook the armature bail spring. Check the related adjustment given in paragraph 456.

456. Armature Up-stop Adjustment

(B, fig. 311)

Note. In order to make this adjustment, it will be necessary to remove the punch mechanism from the perforator unit. Therefore, it should not be made unless there is good reason to believe that it is causing operating failure, or a complete reassembly of the unit has been undertaken. To remove the punch mechanism refer to paragraphs 129*a*(3) and 130*a*(2) through (6). After the adjustment has been made, replace the punch mechanism (pars. 130*d* and 129*d*). Remake the punch position adjustment (par. 386).

a. Requirement. With the armature in the unoperated position, the gap between the armature and pole face should be .025 to .030 inch at the closest point.

b. Method of Checking. Measure the clearance given in the requirement with a round wire gage.

c. Adjustment. Loosen the eccentric mounting nut. Rotate the eccentric to obtain the requirement. Keep the high part of the eccentric to the left; tighten the mounting nut.

457. Drive Link Adjustment

(A, fig. 312)

a. Requirement. With the backspace mechanism in the operated position, the feed wheel ratchet in the detented position, the drive link latch engaged with the eccentric arm and the high part of the eccentric to the right, there should be .001- to .003-inch clearance between the backspace feed pawl and feed wheel ratchet tooth.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

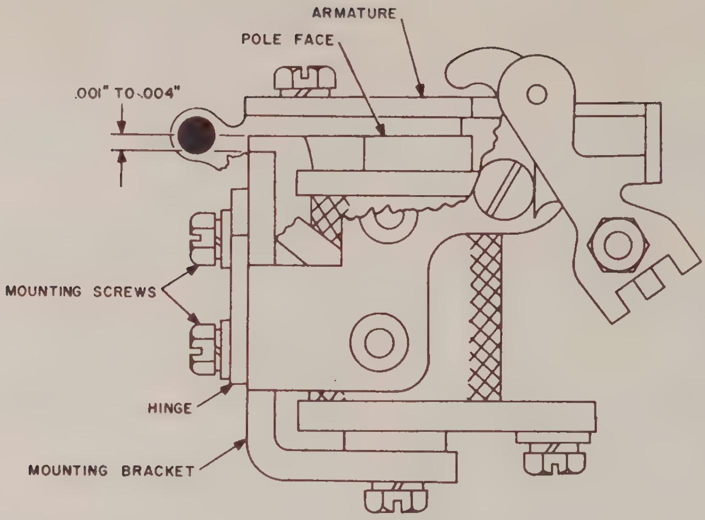
c. Adjustment. Loosen the drive link screw to friction tightness. By means of the pry point, position the adjusting link to obtain the requirement; tighten the drive link screw. Check the related adjustment given in paragraph 459.

458. Backspace Feed Pawl Adjustment (Final for Power Drive Mechanism)

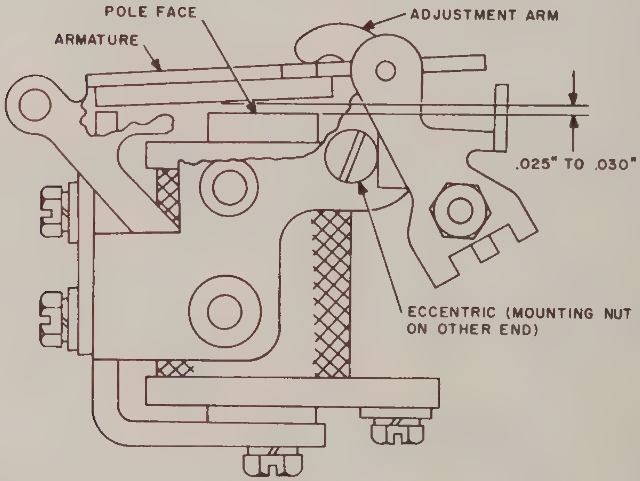
(A, fig. 312)

a. Requirement. With the feed wheel ratchet backed one space to a fully detented position and the eccentric arm in its extreme right position, there should be some clearance, not more than .003 inch, between the backspace feed pawl and ratchet tooth at four random positions about the periphery of the feed wheel ratchet.

b. Method of Checking. Set up the condition given in the requirement at four random


ARMATURE
POLE FACE
.001" TO .004"
MOUNTING SCREWS
HINGE
MOUNTING BRACKET

A. FRONT VIEW


POLE FACE
ARMATURE
ADJUSTMENT ARM
.025" TO .030"
ECCENTRIC (MOUNTING NUT
ON OTHER END)

B. FRONT VIEW

TM5815-263-35-233

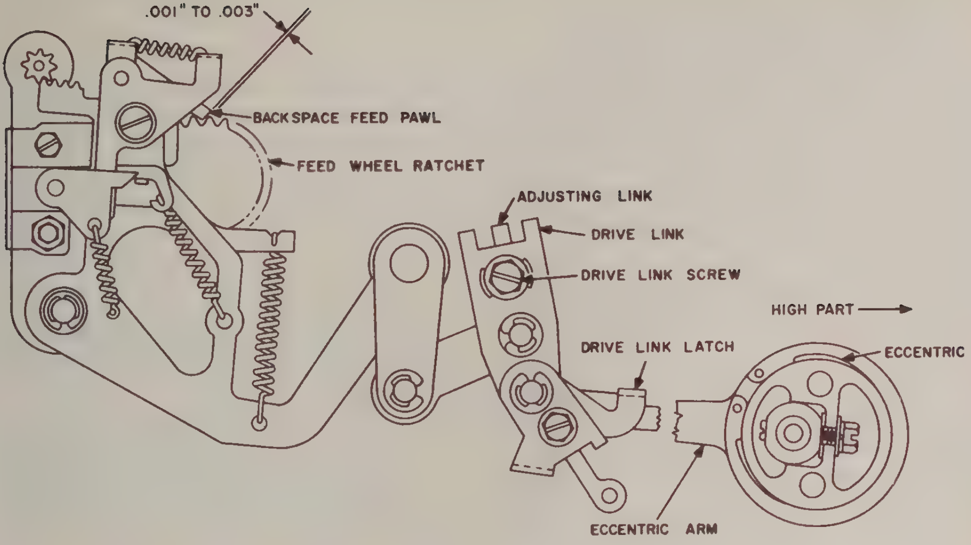
Figure 311. Power drive backspace mechanism.

points of the feed wheel ratchet and measure the clearance at each position with a flat feeler gage.

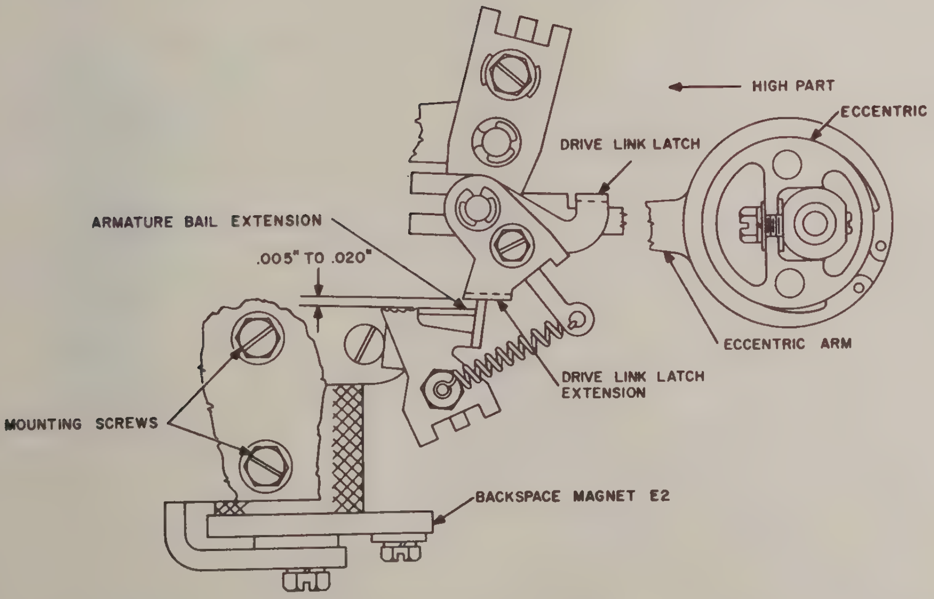
c. Adjustment. Loosen the drive link screw to friction tightness. By means of the pry point, position the drive link to obtain the requirement; tighten the drive link screw.

459. Drive Link Latch Extension Adjustment
(B, fig. 312)

Note. In order to make this adjustment it will be necessary to remove the punch mechanism from the perforator unit. Therefore, it should not be made unless there is good reason to believe that it is causing operating failure, or a complete reassembly of the unit has


.001" TO .003"
BACKSPACE FEED PAWL
FEED WHEEL RATCHET
ADJUSTING LINK
DRIVE LINK
DRIVE LINK SCREW
HIGH PART
DRIVE LINK LATCH
ECCENTRIC
ECCENTRIC ARM

A. FRONT VIEW


HIGH PART
ECCENTRIC
DRIVE LINK LATCH
ARMATURE BAIL EXTENSION
.005" TO .020"
ECCENTRIC ARM
DRIVE LINK LATCH EXTENSION
MOUNTING SCREWS
BACKSPACE MAGNET E2

B. FRONT VIEW

TM5815-263-35-234

Figure 312. Power drive backspace mechanism.

has been undertaken. To remove the punch mechanism refer to paragraphs 129*a* and 130*a*(2) through (6). After the adjustment has been made, replace the punch mechanism (par. 130*d* and 129*d*). Remake the punch position adjustment (par. 386).

a. Requirement. With the backspace mechanism in the unoperated position, the high part of the eccentric to the left, the armature against the pole face, and the drive link latch resting on the eccentric arm notch, there should be .005- to .020-inch clearance between the top of the armature bail extension and the drive link latch extension.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the backspace magnet E6 moutning screws to friction tightness. Swing the magnet clockwise or counterclockwise, as necessary, to obtain the requirement; tighten the mounting screws. Check the related adjustment given in paragraph 461.

460. Drive Link Latch Adjustment
(fig. 313)

a. Requirement. With the backspace mechanism in the unoperated position, the armature off the pole face (magnet deenergized), the drive link latch extension against the end of the armature bail extension and the eccentric arm at its closest point to the underside of the drive link latch, there should be .005- to .025-inch clearance between the drive link latch and the eccentric arm.

b. Method of Checking. Measure the clearance given in the requirement with a round wire gage.

c. Adjustment. Loosen the drive link latch extension screw. Position the drive link latch to obtain the requirement; tighten the screw.

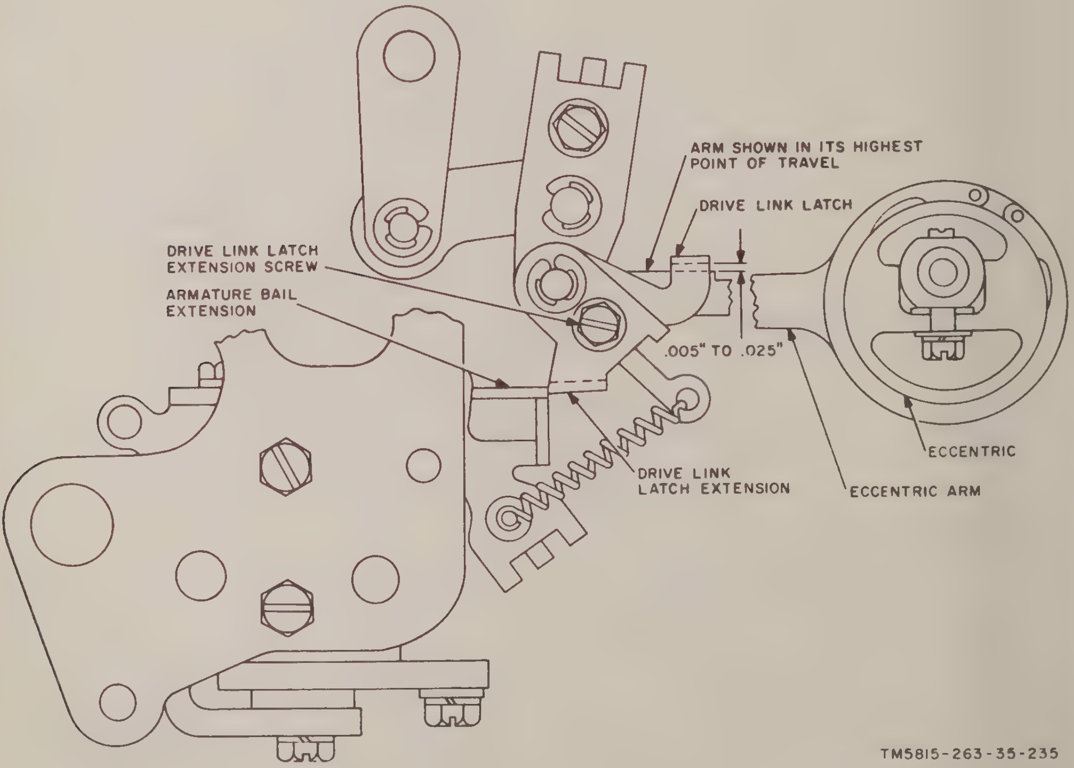

ARM SHOWN IN ITS HIGHEST POINT OF TRAVEL
DRIVE LINK LATCH
DRIVE LINK LATCH EXTENSION SCREW
ARMATURE BAIL EXTENSION
.005" TO .025"
ECCENTRIC
DRIVE LINK LATCH EXTENSION
ECCENTRIC ARM
TM5815-263-35-235

Figure 313. Power drive backspace mechanism, front view.

Check the related adjustment given in paragraph 459.

461. Non-Repeat Arm Adjustment
(fig. 314)

a. Requirement. With the backspace mechanism in the unoperated position, there should be .002- to .010-inch between the top surface of the non-repeat arm and the lowest point of the drive link latch extension.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the adjusting arm screw to friction tightness. Position the adjusting arm to obtain the requirement; tighten the adjusting arm screw.

462. Return Latch Spring Tension
(fig. 315)

a. Requirement. With the backspace mechanism in the unoperated position, it should require 14 to 26 ounces to start the return latch moving.

b. Method of Checking. Hook a 32-ounce scale under the return latch and pull in an upward direction.

c. Adjustment. Replace the return latch spring if it fails to meet the requirement.

463. Backspace Feed Pawl Spring Tension
(fig. 315)

a. Requirement. With the backspace mechanism in the unoperated position, it should require 8 to 15 ounces to start the backspace feed pawl moving.

b. Method of Checking. Hook a 32-ounce scale under the leading edge of the backspace feed pawl and pull at a right angle to the pawl.

c. Adjustment. Replace the backspace feed pawl spring if it fails to meet the requirement.

464. Bell Crank Spring Tension
(fig. 315)

a. Requirement. With the backspace mechanism in the unoperated position, it should require 19 to 23 ounces to pull the bell crank spring to its installed length.

b. Method of Checking. Unhook the spring from the plate. Hook a 32-ounce scale in the spring loop and pull to installed length; rehook the spring to the plate extension.

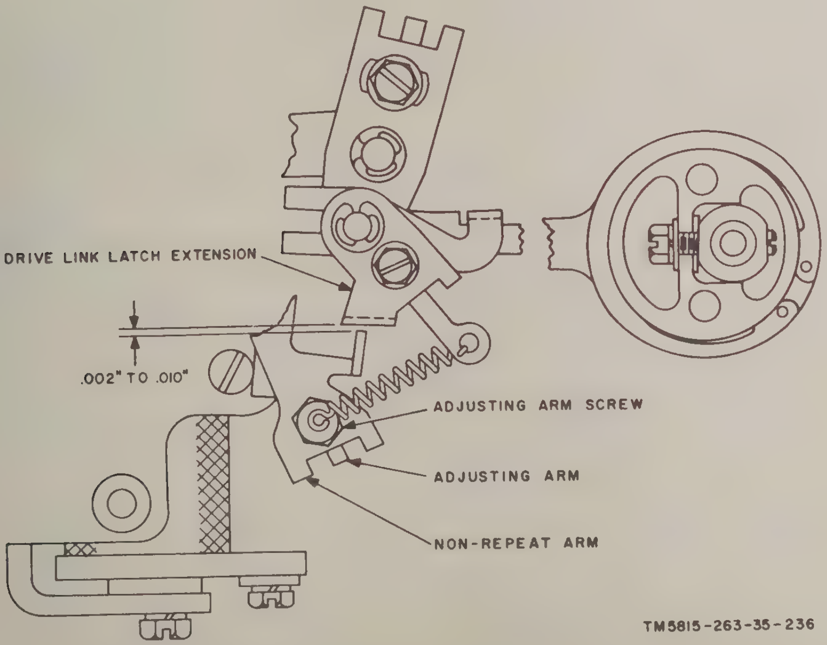


Figure 314. Power drive backspace non-repeat arm, front view.

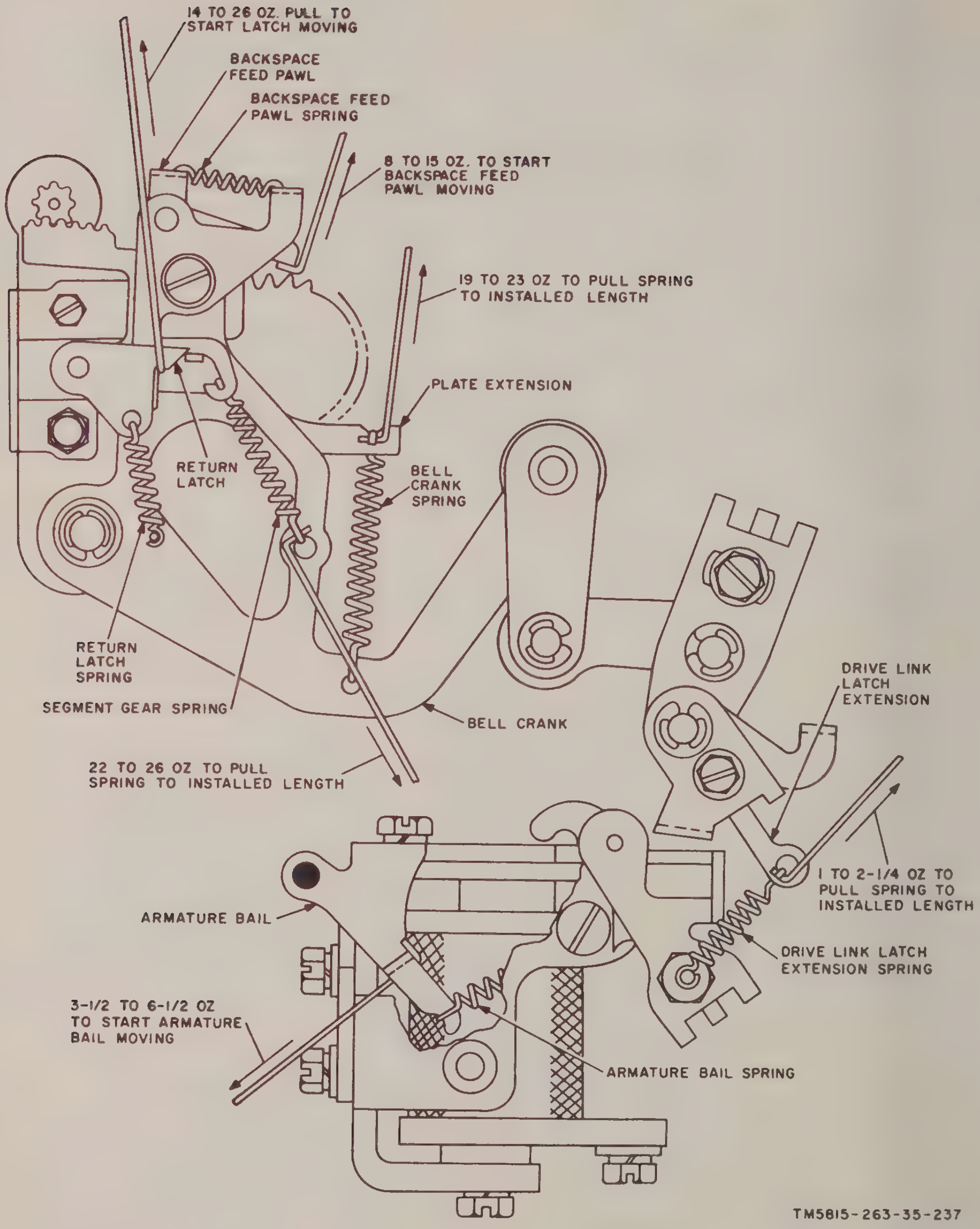

14 TO 26 OZ. PULL TO START LATCH MOVING
BACKSPACE FEED PAWL
BACKSPACE FEED PAWL SPRING
8 TO 15 OZ. TO START BACKSPACE FEED PAWL MOVING
19 TO 23 OZ TO PULL SPRING TO INSTALLED LENGTH
PLATE EXTENSION
RETURN LATCH
BELL CRANK SPRING
RETURN LATCH SPRING
SEGMENT GEAR SPRING
BELL CRANK
22 TO 26 OZ TO PULL SPRING TO INSTALLED LENGTH
DRIVE LINK LATCH EXTENSION
ARMATURE BAIL
1 TO 2-1/4 OZ TO PULL SPRING TO INSTALLED LENGTH
DRIVE LINK LATCH EXTENSION SPRING
3-1/2 TO 6-1/2 OZ TO START ARMATURE BAIL MOVING
ARMATURE BAIL SPRING
TM5815-263-35-237

Figure 315. Power drive backspace mechanism, front view.

c. Adjustment. Replace the bell crank spring if it fails to meet the requirement.

465. Segment Gear Spring Tension
(fig. 315)

a. Requirement. With the backspace mechanism in the unoperated position, it should require 22 to 26 ounces to pull the segment gear spring to its installed length.

b. Method of Checking. Unhook the spring from the bell crank spring post. Hook a 32-ounce scale in the spring loop and pull to installed length; rehook the spring to the post.

c. Adjustment. Replace the segment gear spring if it fails to meet the requirement.

466. Drive Link Latch Extension Spring Tension
(fig. 315)

a. Requirement. With the backspace mechanism in the unoperated position, it should require 1 to 2¼ ounces to pull the drive link, latch extension spring to its installed length.

b. Method of Checking. Unhook spring from the drive link latch extension. Hook an 8-ounce scale in the spring loop and pull to installed length; rehook spring to extension.

c. Adjustment. Replace the latch extension spring if it fails to meet the requirement.

467. Armature Bail Spring Tension
(fig. 315)

a. Requirement. It should require 3½ to 6½ ounces to start the armature bail moving.

b. Method of Checking. Hook a 32-ounce scale over the lower extension on the armature bail and pull at a right angle to the extension.

c. Adjustment. Replace the armature bail spring if it fails to meet the requirement.

Section XX. ADJUSTMENT OF KEYBOARD BASE

468. General

This section contains the requirements and adjustment procedures for the keyboard base. Adjustments are arranged in the proper sequence for a complete readjustment of the unit. When making an individual adjustment, check all related adjustments. When it is necessary to remove parts of assemblies in order to make an adjustment, reference is made to specific paragraphs for removal and replacement instructions.

a. Removal. Remove the keyboard base as described in paragraph 82*a*.

b. Replacement. Replace the keyboard base as described in paragraph 82*b*.

c. Keyboard Control Switch. K (keyboard), K–T (keyboard & tape), and T (tape) refer to corresponding positions of the keyboard control switch. Unless otherwise specified, all adjustments will be made with the keyboard control knob in the K–T position.

469. Code Bar Guide Clearance Adjustment
(A, fig. 316)

Note. Remove the keyboard base from the cabinet before adjusting the code bar guide.

a. Requirement. There should be .001- to .006-inch clearance between the top of the code bars and the code bar guide. All the code bars should move freely without bind at any point in their travel.

b. Method of Checking. Measure the clearance between the No. 1 and No. 5 code bars and the code bar guide with a round wire gage. Move the code bars from right to left to check for freedom of movement or bind.

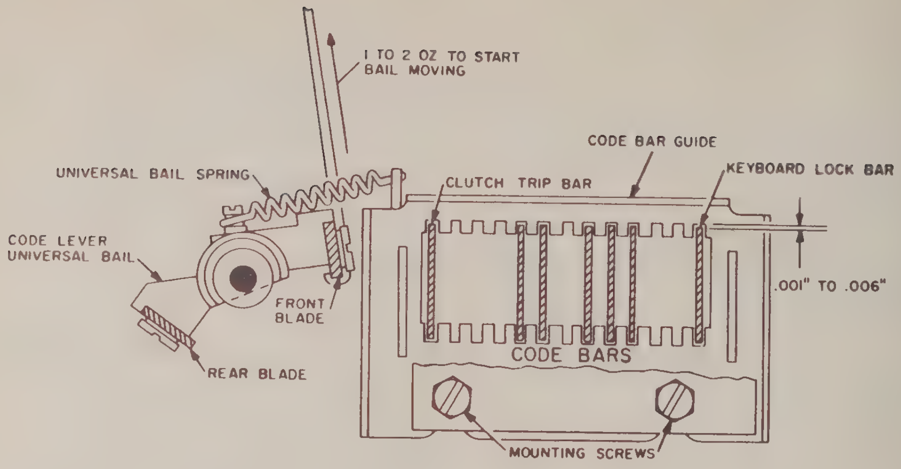
c. Adjustment. Loosen the mounting screws on the right-hand and/or left-hand code bar guide to friction tightness. Lift the guide, then gently tap it down until the proper clearance is obtained; tighten the mounting screws.

470. Code Lever Universal Bail Spring Tension

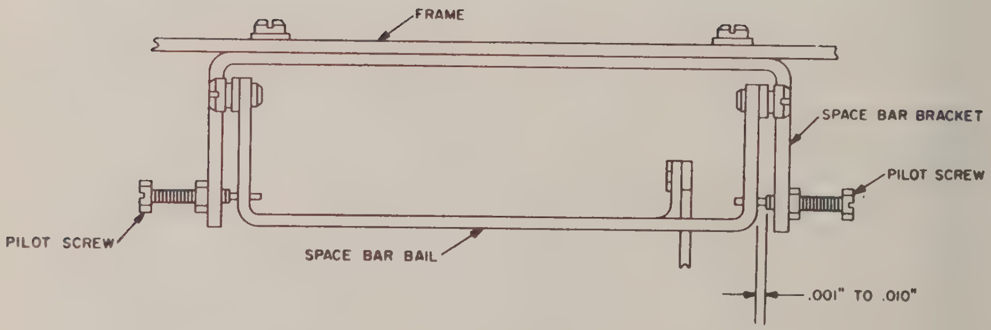
a. Requirement. When the signal generator clutch is disengaged, it should require 1 to 2 ounces to start the code lever universal bail moving (A, fig. 316).

b. Method of Checking. With the signal generator clutch disengaged, hold the universal bail latch lever (A, fig. 323) up and out of contact with the code lever universal bail. Hook an 8-ounce scale under the front blade (A, fig. 316), just to the left of the universal bail spring, and pull up.

c. Adjustment. Replace the code lever universal bail spring if it fails to meet the requirement.


1 TO 2 OZ TO START BAIL MOVING
CODE BAR GUIDE
UNIVERSAL BAIL SPRING
CLUTCH TRIP BAR
KEYBOARD LOCK BAR
CODE LEVER UNIVERSAL BAIL
.001" TO .006"
FRONT BLADE
CODE BARS
REAR BLADE
MOUNTING SCREWS

A. LEFT VIEW


FRAME
SPACE BAR BRACKET
PILOT SCREW
PILOT SCREW
SPACE BAR BAIL
.001" TO .010"

B. TOP VIEW

TM5815-264-35-226

Figure 316. Code bar and space bar mechanism.

471. Space Bar Bail Pivot Adjustment
(B, fig. 316)

Note. The key lever hood must be removed (par. 147*a*(1)–(3)) in order to check the requirement. After the adjustment has been made, replace the hood as described in paragraph 147*d*.

a. Requirement. There should be .001-. to .010-inch end play in the space bar bail.

b. Method of Checking. Measure the clearance between the space bar bail and the shoulder on the pilot screw with a flat feeler gage.

c. Adjustment. Loosen the locknut on the right and/or left pilot screw. Position the space bar bail by advancing or retarding the right and/or left pilot screw to obtain the requirement; tighten the lock nuts.

Note. The bail should be adjusted so that the space bar can be operated without binding in the holes in the key lever guide plate and frame.

472. Clutch Shoe Lever Adjustment

a. Requirement. The clearance between the clutch shoe lever (A, fig. 317) and the clutch cam disk stop lug should be .055- to .085-inch less when the clutch is engaged than when the clutch is disengaged.

b. Method of Checking. Measure the requirement with a round wire gage under the following conditions:

(1) Latch the clutch in the disengaged position.

(2) Measure and note the clearance between the clutch shoe lever and stop lug.

(3) Rotate the gear sleeve assembly until the oilhole in the sleeve is upward.

(4) Trip the clutch stop lever to engage the clutch.

(5) Measure the clearance between the clutch shoe lever and stop lug, and compare it with the clearance noted in (2) above.

c. Adjustment.

(1) Adjust the clutch shoe lever as follows:

  (*a*) Loosen the two clamp screws on the clutch cam disk.

  (*b*) Engage a wrench or screwdriver on the lug of the adjusting disk and rotate the adjusting disk to obtain the requirement.

  (*c*) Tighten the two clamp screws.

(2) Check the clutch drum for drag as follows:

  (*a*) Disengage the clutch.

  (*b*) Hook a 32-ounce scale on the top tooth of the gear (B, fig. 317) and pull at a right angle to the radius of the gear.

  (*c*) If a pull of 12 ounces, or more, is required to move the drum, repeat (1) (*a*) through (*c*) above and refine the adjustment towards the maximum clearance.

473. Clutch Stop Lever Adjustment
(A, fig. 318)

a. Requirement. The clutch stop lever should fully engage the clutch shoe lever. During rotation the stop lever should not touch the clutch drum at any point.

b. Method of Checking. Trip the clutch stop lever and rotate the gear sleeve assembly in the normal direction of rotation. Note the clearance between the stop lever and the clutch drum.

c. Adjustment. Loosen the stop lever clamp screw. Position the lever to obtain the requirement; tighten the clamp screw.

474. Clutch Stop Lever Spring Tension
(A, fig. 318)

a. Requirement. With the clutch engaged and the gear sleeve assembly rotated approximately ¼ turn, it should require 2 to 3 ounces to start the clutch stop lever moving.

b. Method of Checking. Trip the clutch stop lever and rotate the gear sleeve assembly approximately ¼ turn. Hook an 8-ounce scale under the lever at the bend, just above the spring hole, and pull at a right angle to the lever.

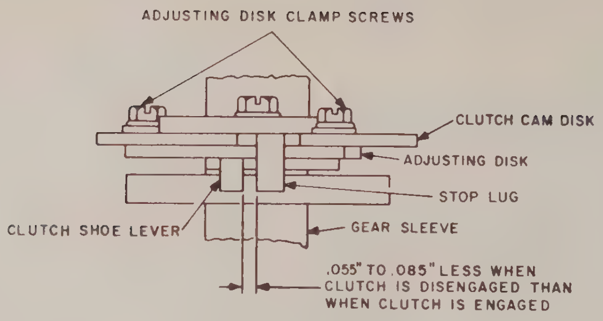
c. Adjustment. Replace the clutch stop lever spring if it fails to meet the requirement.

475. Clutch Latch Lever Spring Tension
(B, fig. 318)

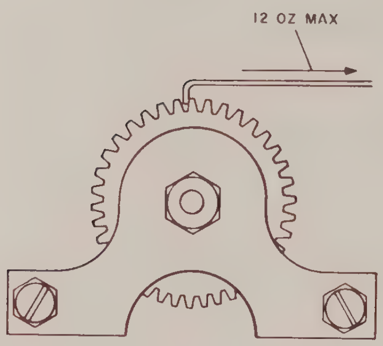
a. Requirement. When the clutch latch lever is resting on the highest part of the clutch cam disk, it should require 2 to 3 ounces to start the latch lever moving.

b. Method of Checking. With the clutch engaged and rotated until the latch lever is resting on the highest point of the clutch cam disk, hook an 8-ounce scale under the lever, just above the spring hole, and pull at a right angle to the clutch latch lever.

c. Adjustment. Replace the clutch latch lever spring if it fails to meet the requirement.


ADJUSTING DISK CLAMP SCREWS
CLUTCH CAM DISK
ADJUSTING DISK
STOP LUG
CLUTCH SHOE LEVER
GEAR SLEEVE
.055" TO .085" LESS WHEN CLUTCH IS DISENGAGED THAN WHEN CLUTCH IS ENGAGED

A. TOP VIEW


12 OZ MAX

B. REAR VIEW

TM5815-264-35-227

Figure 317. Signal generator clutch and gear mechanism.

476. Transfer Bail Detent Plate Adjustment
(A, fig. 319)

a. Requirement. There should be equal left-hand and right-hand clearance within .002 inch, between the transfer bail latch and the projection on transfer bail when the transfer bail is at its extreme left (or right) hand position.

b. Method of Checking. Rotate the signal generator cam assembly and measure the clearance between the transfer bail detent latch and the projection on the transfer bail when the transfer bail is at its extreme left (or right) hand position as these occur in the sequence to generate the Y character on the start and No. 1 pulses only.

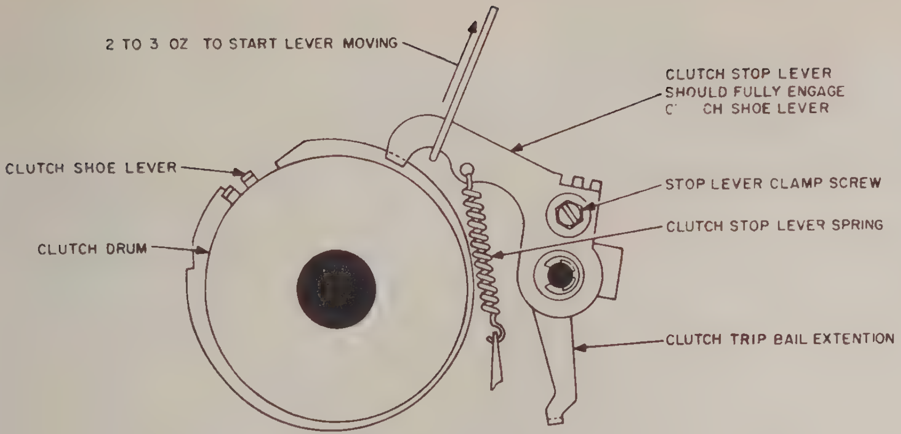
c. Adjustment. Loosen the two detent plate mounting screws on the signal generator front plate. Rotate the detent plate left or right by placing a screwdriver between the front plate and the detent plate to obtain the requirement; tighten the mounting screws. Check the related adjustment described in paragraph 478.

477. Transfer Bail Detent Latch Spring Tension
(A, fig. 319)

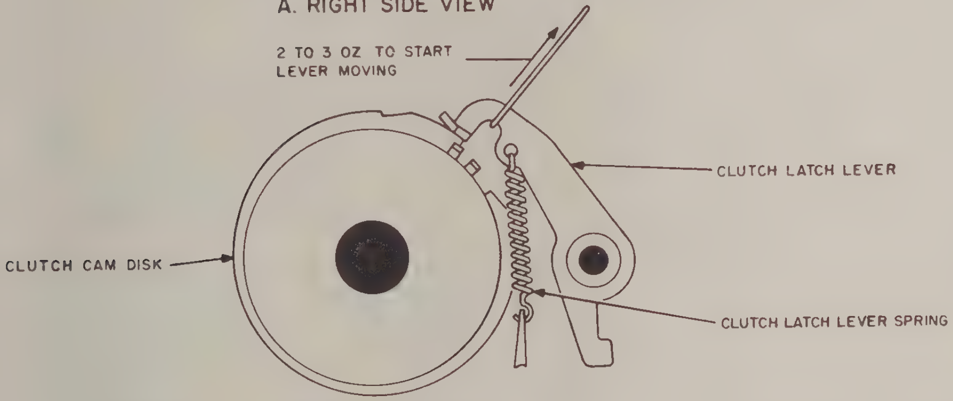
a. Requirement. When the transfer bail is held in the left-hand position, it should require 2¾ to 4¼ ounces to start the transfer bail detent latch moving.

b. Method of Checking. Hook an 8-ounce scale over the right-hand detent latch and pull to the right.

c. Adjustment. Replace the detent latch spring if it fails to meet the requirement.


2 TO 3 OZ TO START LEVER MOVING
CLUTCH STOP LEVER SHOULD FULLY ENGAGE C CH SHOE LEVER
CLUTCH SHOE LEVER
STOP LEVER CLAMP SCREW
CLUTCH STOP LEVER SPRING
CLUTCH DRUM
CLUTCH TRIP BAIL EXTENTION

A. RIGHT SIDE VIEW


2 TO 3 OZ TO START LEVER MOVING
CLUTCH LATCH LEVER
CLUTCH CAM DISK
CLUTCH LATCH LEVER SPRING

B. RIGHT SIDE VIEW

TM 5815-264-35-228

Figure 318. Signal generator clutch and lever mechanism.

478. Contact Box Contact Clearance Adjustment

(B, fig. 319)

a. Requirement. The marking and spacing contact gaps should be equal to within .001 inch.

b. Method of Checking. Depress the V-key-lever and rotate the signal generator cam assembly until each contact has fully opened. Measure the clearance between the contacts.

c. Adjustment. Slightly loosen the two mounting screws on the signal generator front plate. Position the contact box to the left or right by means of the eccentric to obtain equalized contact clearance. Tighten the mounting screws.

Note. The adjustment should be checked with a distortion test set, if available (par. 638*h*). Carefully refine the adjustment to eliminate all bias from the signals by equalizing the current-on and current-off intervals.

479. Drive Link Spring Tension

(B, fig. 319)

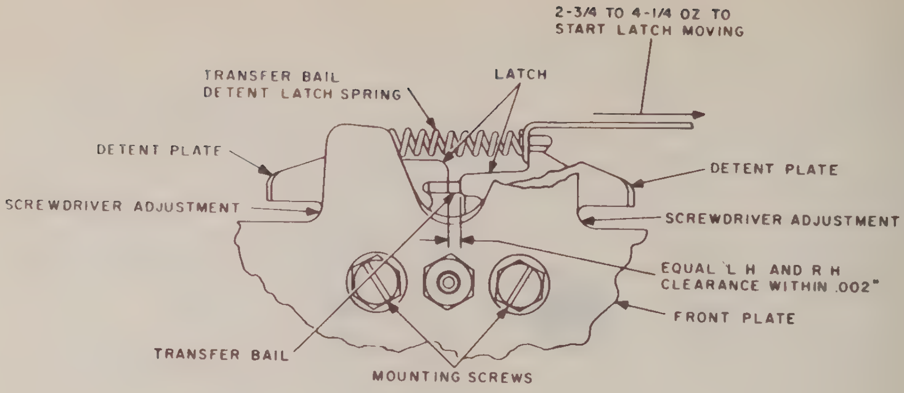
a. Requirement. With the drive link spring removed, it should require 11 to 13 ounces to pull the spring to an extended length of approximately $\frac{7}{16}$ inch. Replace the drive link spring.

b. Adjustment. Replace the drive link spring if it fails to meet the requirement.

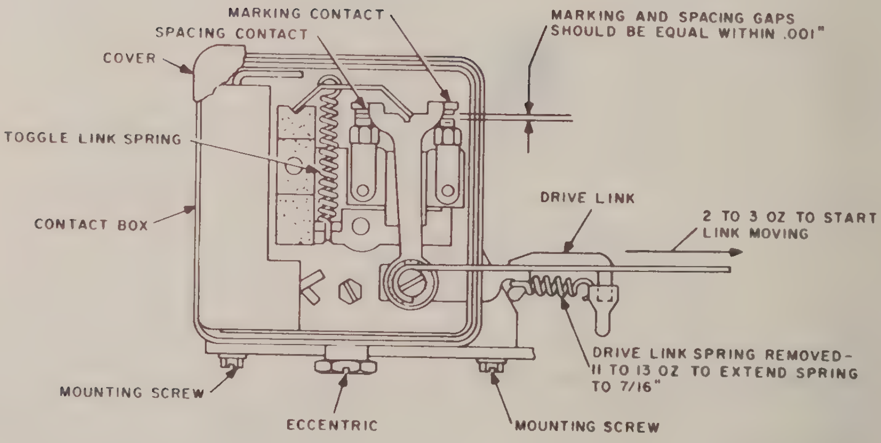
480. Toggle Link Spring Tension

(B, fig. 319)

a. Requirement. When the transfer bail is


2-3/4 TO 4-1/4 OZ TO START LATCH MOVING
TRANSFER BAIL DETENT LATCH SPRING
LATCH
DETENT PLATE
SCREWDRIVER ADJUSTMENT
DETENT PLATE
SCREWDRIVER ADJUSTMENT
EQUAL L H AND R H CLEARANCE WITHIN .002"
FRONT PLATE
TRANSFER BAIL
MOUNTING SCREWS

A. FRONT VIEW


MARKING CONTACT
SPACING CONTACT
COVER
MARKING AND SPACING GAPS SHOULD BE EQUAL WITHIN .001"
TOGGLE LINK SPRING
DRIVE LINK
CONTACT BOX
2 TO 3 OZ TO START LINK MOVING
DRIVE LINK SPRING REMOVED-11 TO 13 OZ TO EXTEND SPRING TO 7/16"
MOUNTING SCREW
ECCENTRIC
MOUNTING SCREW

B. TOP VIEW

TM5815-264-35-229

Figure 319. Transfer bail and contact box mechanism.

held clear of the drive link, it should require 2 to 3 ounces to start the drive link moving.

b. Method of Checking. Remove the cover of the contact box, and the drive link spring. Hook an 8-ounce scale on the pivot screw and pull to the right. Replace the drive link spring and the contact box cover.

c. Adjustment. Replace the toggle link spring if it fails to meet the requirement.

481. Code Bar and Code Lever Clearance Adjustment

(fig. 320)

Note. If necessary, remove the character counter assembly. Refer to paragraph 159 for removal and installation.

a. Requirement. With the CAR RET keylever depressed but not far enough to trip off the universal bail latch lever or clutch trip bar, there should be .010- to .015-inch clearance between the left-hand side of the carriage return code lever (A) and the No. 5 code bar.

b. Adjustment. Loosen the four screws that secure the code lever guide assembly. Insert the blade of a screwdriver in the adjustment slot (B) and position the guide assembly to the left, or right, to obtain the requirement; tighten the mounting screws. Check the related adjustments described in paragraphs 484, 485 and 528.

482. Clutch Trip Bar Spring Tension

(A, fig. 320)

a. Requirement. With the power off, the clutch disengaged, and the blank keylever depressed to allow the clutch trip bar to fall to the right, it should require 8 to 12 ounces to pull the clutch trip bar spring to its installed length.

b. Method of Checking. Unhook the clutch trip bar spring from the spring bracket. Hook a 32-ounce scale in the spring loop and pull the spring to installed length. Rehook the spring on the bracket.

c. Adjustment. Replace the clutch trip bar spring if it fails to meet the requirement.

483. Code Bar Spring Tension

a. Requirement. With the power off and the keyboard control knob in the K position, depress the LTRS keylever and hold the transfer levers (A, fig. 329) to the right so they do not affect the code bars. It should require 3 to 5 ounces to start the code bar (B, fig. 320) moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the right-hand end of each code bar (B, fig. 320), as indicated in (A), and push to the left. Check the tension of the five code bar springs and the two character counter code bar springs.

c. Adjustment. Replace any code bar or character counter code bar spring if it fails to meet the requirement.

484. Function Bails and Code Lever Clearance Adjustment

(B, fig. 321)

a. Requirement. There should be at least .015-inch clearance between any function bail and its associated code lever.

b. Method of Checking. Measure the clearance given in the requirement with a round wire gage.

c. Adjustment. Loosen the typing unit locating stud at each end of the function bail assembly. Make certain that a typing unit mounting screw is threaded in the hole adjacent to each locating stud (to prevent the typing unit mounting straps, located beneath the base, from shifting). Position the function bail assembly to obtain the requirement; tighten the locating studs.

485. Lock Ball Channel Adjustment

(A, fig. 321)

Note. This adjustment should not be checked unless the lock ball channel has been disassembled (par. 151*b*).

a. Requirement. There should be .001- to .006-inch clearance between the end of the lock ball channel and the lateral adjusting screw when most of the code levers are centrally located in the lock ball channel slots.

b. Method of Checking. Remove the lock ball retainer. Remove a wedgelock from each end and one from the center in order to view the position of the code lever.

c. Adjustment. Adjust the lock ball channel as follows:

(1) Loosen the lock ball channel mounting screws.

(2) Back off the lateral adjusting screws and position the lock ball channel.

(3) Turn one lateral adjusting screw in against the end of the channel and lock it.

(4) Turn the other lateral adjusting screw into the end of the channel and back it off ¼ turn; lock the screw.

(5) Replace the wedgelocks and check their position with respect to the balls.

(6) Pull the channel assembly downward until all code levers strike their up-

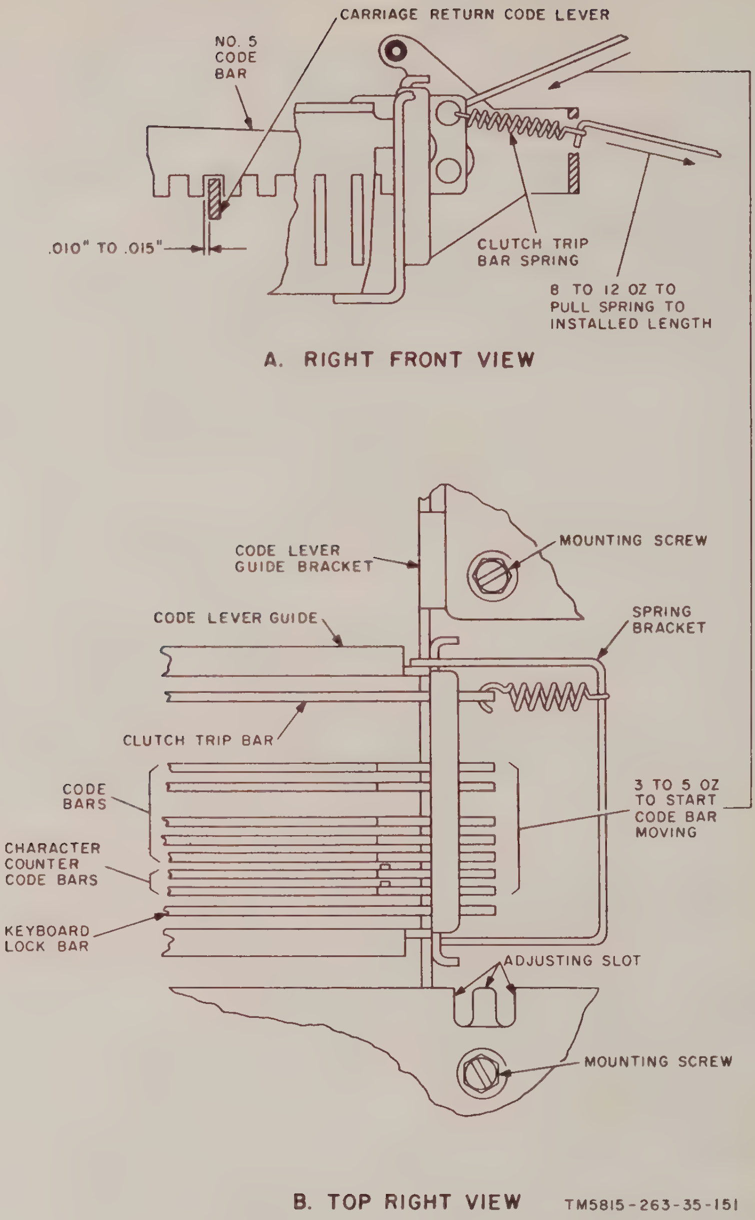

CARRIAGE RETURN CODE LEVER
NO. 5 CODE BAR
.010" TO .015"
CLUTCH TRIP BAR SPRING
8 TO 12 OZ TO PULL SPRING TO INSTALLED LENGTH
A. RIGHT FRONT VIEW
CODE LEVER GUIDE BRACKET
MOUNTING SCREW
CODE LEVER GUIDE
SPRING BRACKET
CLUTCH TRIP BAR
CODE BARS
3 TO 5 OZ TO START CODE BAR MOVING
CHARACTER COUNTER CODE BARS
KEYBOARD LOCK BAR
ADJUSTING SLOT
MOUNTING SCREW
B. TOP RIGHT VIEW
TM5815-263-35-151

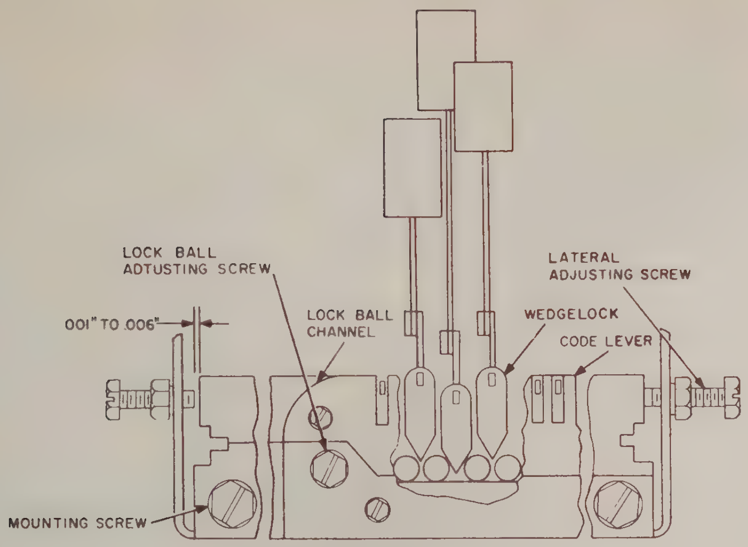
Figure 320. Code bar and code lever mechanism.

stop without the wedgelocks jumping out of position.

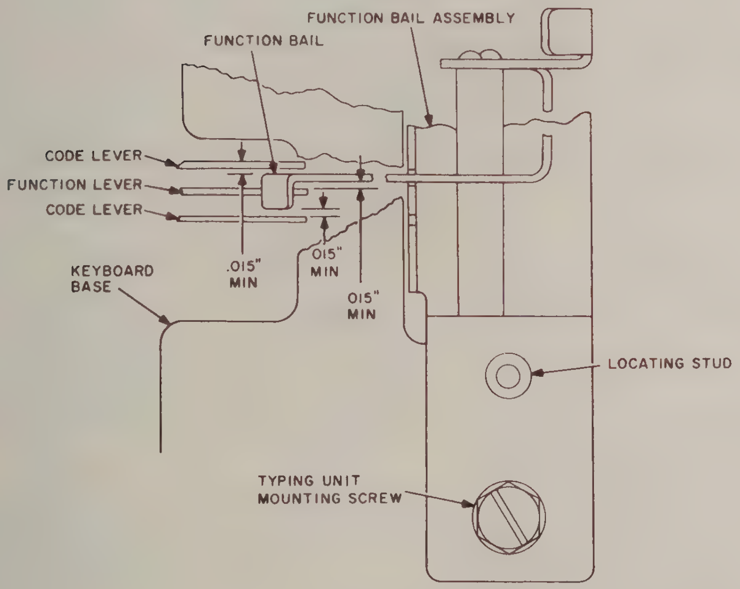
(7) Replace the lock ball retainer.

(8) Loosen the locknut on the lock ball adjusting screw. Back off the adjusting screw to obtain the requirement; tighten the locknut.

(9) Check the related adjustment described in paragraph 201.


LOCK BALL
ADTUSTING SCREW
001" TO .006"
LOCK BALL
CHANNEL
LATERAL
ADJUSTING SCREW
WEDGELOCK
CODE LEVER
MOUNTING SCREW

A. FRONT VIEW


FUNCTION BAIL ASSEMBLY
FUNCTION BAIL
CODE LEVER
FUNCTION LEVER
CODE LEVER
KEYBOARD
BASE
.015"
MIN
015"
MIN
015"
MIN
LOCATING STUD
TYPING UNIT
MOUNTING SCREW

B. TOP VIEW

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Figure 321. Function bail and lock ball track mechanism.

486. Code Bar Reset Bail Adjustment (A, fig. 322)

a. Requirement. When the eccentric stud and eccentric follower arm which hold the code bar reset bail are in the extreme reset position to the left, there should be .001- to .006-inch clearance between the code bar reset bail roller and the code bar reset bail latch.

b. Method of Checking. With the signal generator clutch engaged, rotate the cam sleeve assembly until the eccentric stud and eccentric follower arm are in the extreme reset position, to the left. Measure the clearance with a flat or round wire gage.

c. Adjustment. Loosen the locknut on the eccentric stud. Position the eccentric stud to obtain the requirement. Keep the high part of the eccentric stud in the upper half of its arc of adjustment; tighten the lock nut. Check the related adjustments described in paragraphs 511 and 528.

487. Code Bar Reset Bail Latch Spring Tension (A, fig. 322)

a. Requirement. It should require ½ to 1½ ounces to start the code bar reset bail latch moving.

b. Method of Checking. Apply the push end of an 8-ounce scale on the outer end of the reset bail latch to the left of the universal bail latch lever.

c. Adjustment. Replace the code bar reset bail latch spring if it fails to meet the requirement.

488. Code Bar Reset Bail and Non-Repeat Lever Clearance Adjustment (B, fig. 322)

a. Requirement. There should be .010- to .020-inch clearance between the code bar reset bail roller and the step on the non-repeat lever when the mechanism is in the initial trip-off condition.

b. Method of Checking. With power off and any keylever depressed, measure the clearance with a round wire gage.

c. Adjustment. Loosen the locknut and shoulder screw that secures the non-repeat lever and its non-repeat lever crank to the rear plate. Move the non-repeat lever mechanism to the left or right to obtain the requirement; tighten the mounting screw and locknut.

489. Non-Repeat Lever Spring Tension (B, fig. 322)

a. Requirement. With the signal generator clutch disengaged, and any keylever depressed, it should require 2¼ to 3¼ ounces to start the non-repeat lever moving downward, when the mechanism is in the initial trip-off condition.

b. Method of Checking. Apply the push end of an 8-ounce scale to the non-repeat lever crank, to the left of the spring, and push downward.

c. Adjustment. Replace the non-repeat lever spring if it fails to meet the requirement.

490. Universal Bail Latch Lever Adjustment (A, fig. 323)

a. Requirement. When the G code lever is held against its upstop, on the rear of the code bar guide, there should be .005- to .015-inch clearance between the universal bail latch lever and the roller on the code lever universal bail extension.

b. Method of Checking. With the power off and the clutch disengaged, hook a spring hook under the G code lever and hold it up against the upstop. Measure the clearance with a flat feeler gage or a round wire gage.

c. Adjustment. Loosen the eccentric bushing mounting screw. Rotate the eccentric to obtain the requirement. Keep the high part of the eccentric above the horizontal centerline; tighten the mounting screw. Check the related adjustment described in paragraph 492.

491. Universal Bail Latch Lever Spring Tension (A, fig. 323)

a. Requirement. When the clutch is disengaged and the code lever universal bail is held away from the universal bail latch lever, it should require 7 to 8 ounces to start the latch lever moving.

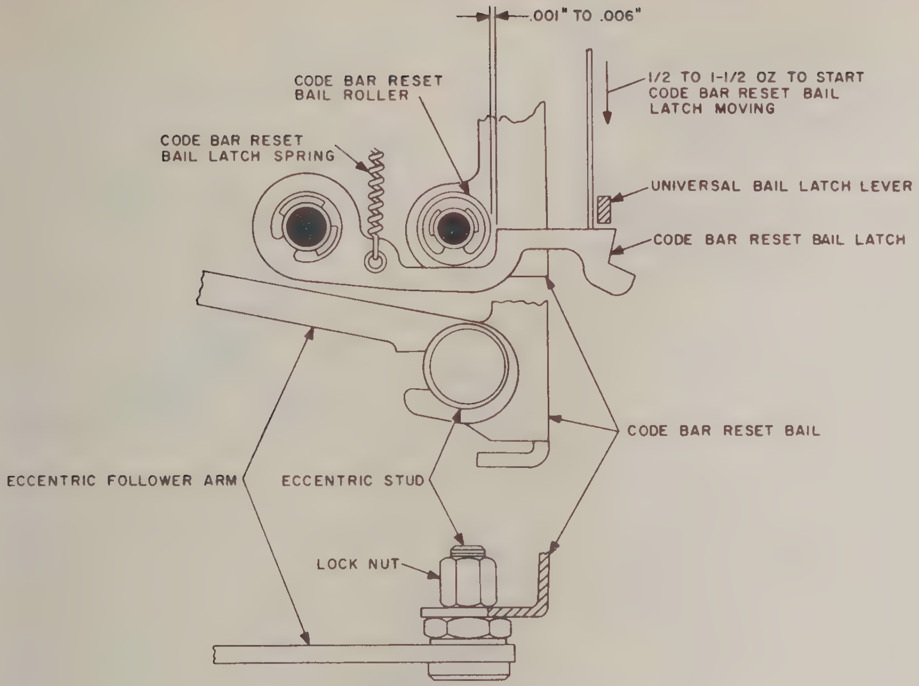
b. Method of Checking. Hook an 8-ounce scale under the latch lever, to the left of the code bar reset bail latch, and pull upward.

c. Adjustment. Replace the universal latch lever spring if it fails to meet the requirement.

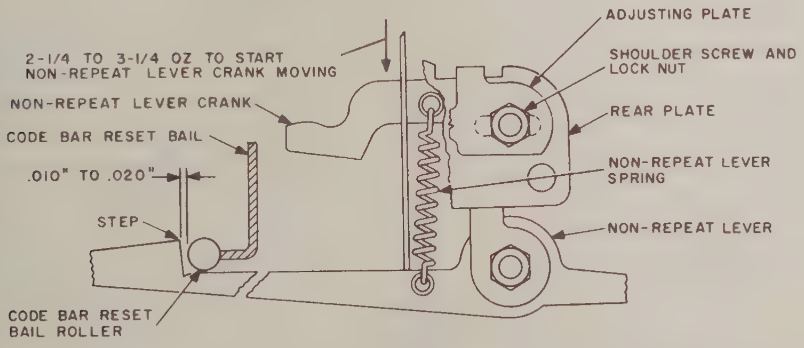
492. Universal Bail Extension Adjustment (B, fig. 323)

a. Requirement. When the code lever universal bail extension roller is resting against the universal bail latch lever, there should be .060- to .080-inch clearance between the code lever universal bail extension and the non-repeat lever.

b. Method of Checking. With the signal generator clutch disengaged, depress and release


.001" TO .006"
CODE BAR RESET BAIL ROLLER
1/2 TO 1-1/2 OZ TO START CODE BAR RESET BAIL LATCH MOVING
CODE BAR RESET BAIL LATCH SPRING
UNIVERSAL BAIL LATCH LEVER
CODE BAR RESET BAIL LATCH
CODE BAR RESET BAIL
ECCENTRIC FOLLOWER ARM
ECCENTRIC STUD
LOCK NUT

A. FRONT AND TOP VIEW


ADJUSTING PLATE
2-1/4 TO 3-1/4 OZ TO START NON-REPEAT LEVER CRANK MOVING
SHOULDER SCREW AND LOCK NUT
NON-REPEAT LEVER CRANK
REAR PLATE
CODE BAR RESET BAIL
.010" TO .020"
NON-REPEAT LEVER SPRING
STEP
NON-REPEAT LEVER
CODE BAR RESET BAIL ROLLER

B. FRONT VIEW

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Figure 322. Code bar reset bail and non-repeat lever mechanisms.

the LTRS key lever. Measure the clearance with a round wire gage.

c. Adjustment. Loosen the two clamp screws on the code lever universal bail extension to friction tightness. Position the extension to obtain the proper clearance. Tighten the clamp screws and recheck the requirement.

493. Local Line Feed Trip Link Spring Tension
(C, fig. 323)

a. Requirement. It should require 5 to 10 ounces to start the local line feed trip link moving.

b. Method of Checking. Hook a 32-ounce

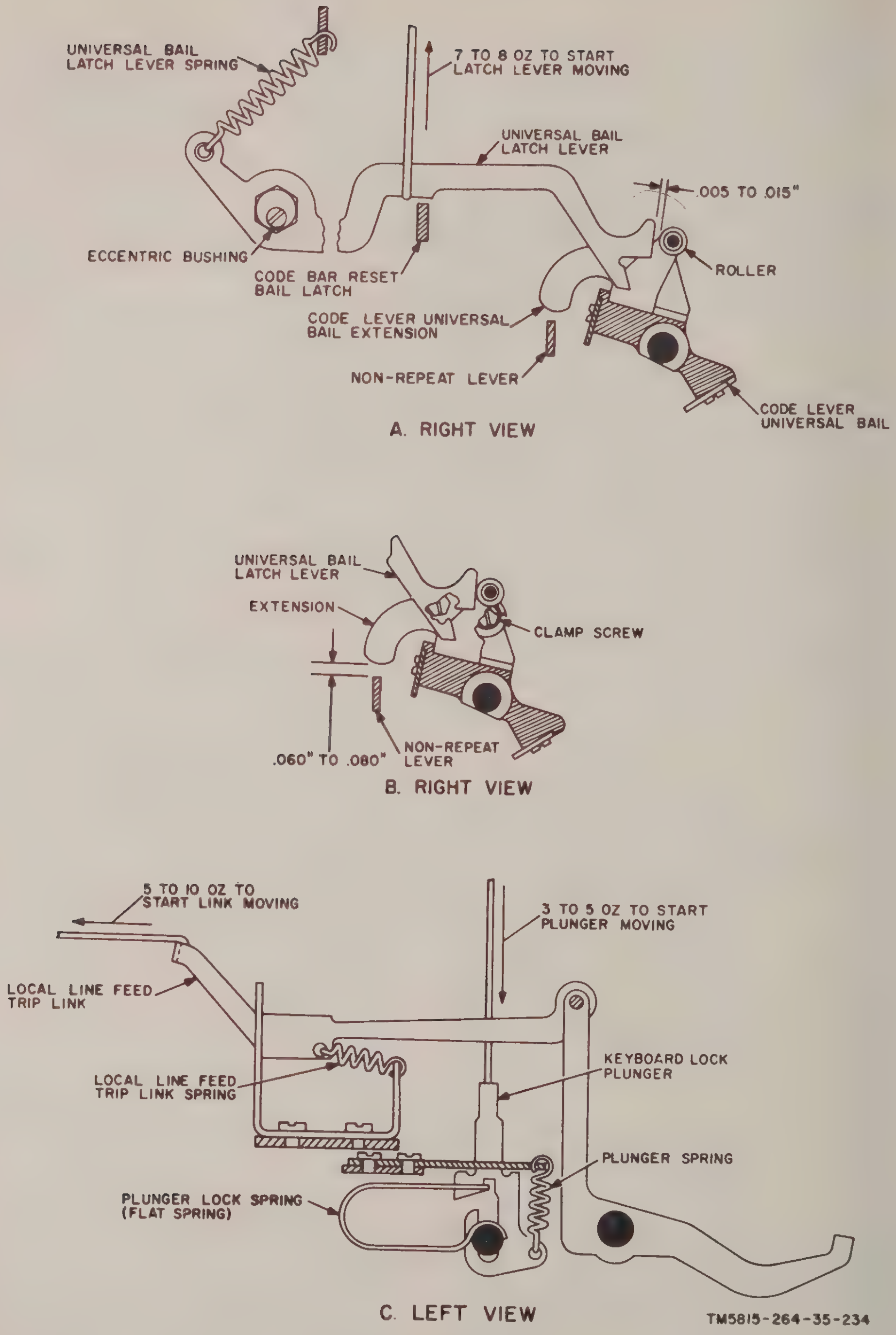

UNIVERSAL BAIL LATCH LEVER SPRING
7 TO 8 OZ TO START LATCH LEVER MOVING
UNIVERSAL BAIL LATCH LEVER
.005 TO .015"
ECCENTRIC BUSHING
CODE BAR RESET BAIL LATCH
ROLLER
CODE LEVER UNIVERSAL BAIL EXTENSION
NON-REPEAT LEVER
CODE LEVER UNIVERSAL BAIL
A. RIGHT VIEW
UNIVERSAL BAIL LATCH LEVER
EXTENSION
CLAMP SCREW
.060" TO .080"
NON-REPEAT LEVER
B. RIGHT VIEW
5 TO 10 OZ TO START LINK MOVING
3 TO 5 OZ TO START PLUNGER MOVING
LOCAL LINE FEED TRIP LINK
KEYBOARD LOCK PLUNGER
LOCAL LINE FEED TRIP LINK SPRING
PLUNGER SPRING
PLUNGER LOCK SPRING (FLAT SPRING)
C. LEFT VIEW
TM5815-264-35-234

Figure 323. Universal bail latch lever and local line feed trip link mechanisms.

scale over the rear end of the trip link and pull to the rear.

c. Adjustment. Replace the local line feed trip link spring if it fails to meet the requirement.

494. Keyboard Lock Plunger Spring Tension
(C, fig. 323)

a. Requirement. When the REC keylever is held depressed, it should require 3 to 5 ounces to start the keyboard lock plunger moving downward.

b. Method of Checking. With the REC keylever held depressed, apply the push end of an 8-ounce scale to the keyboard lock plunger and push downward.

c. Adjustment. Replace the keyboard lock plunger spring if it fails to meet the requirement.

495. Ball Wedgelock and Ball Track Clearance Adjustment
(fig. 324)

Note. In order to check this adjustment, and the lock ball end play adjustment (par. 496), the keylever hood should be removed (par. 147*a*(1)–(3)); then replace (par. 147*d*) after both adjustments have been made.

a. Requirement. There should be .015- to .020-inch clearance between the tip of the wedgelock and the ball track when the A or P keylever is fully depressed.

b. Method of Checking. Loosen the locknut on the adjusting screw. Back off the adjusting screw to permit maximum ball movement without the balls rolling out of the track. Hold the A keylever fully depressed and measure the clearance at the left-hand side of the track, then hold the P keylever fully depressed and measure the clearance at the right-hand side of the track.

Note. If the balls should accidently roll out of the track, make certain that a total of 43 balls are replaced on the track before proceeding with the adjustment.

c. Adjustment. Loosen the mounting screws at each end of the ball track. Position the track to obtain the requirement; tighten the mounting screws.

496. Lock Ball End Play Adjustment
(fig. 324)

Note. Check the requirement described in paragraph 495 before proceeding with this adjustment.

a. Requirements.

(1) The trip off pressure of any keylever in the third row should be between 3 and 5 ounces.

(2) When 6 ounces of pressure is applied perpendicular to the A keylever, in the third row, and the CAR RET keylever is depressed alternately, the A keylever should trip each time.

(3) The signal generator clutch should not trip when two keylevers are depressed simultaneously.

(4) The lock ball end play adjustment should not prevent the code lever of a depressed key from meeting its upstop, at the rear of the code bar guide.

b. Method of Checking. With power on, check the requirement as follows:

(1) Apply the push end of an 8-ounce scale to any keylever in the third row and push downward to measure the requirement given in *a*(1) above. Check the trip off pressure of all keylevers in the third row.

(2) Place the push end of an 8-ounce scale on the A keylever and apply 6 ounces of pressure perpendicular to the keylever. With pressure applied, alternately depress the CAR RET keylever to check the requirement given in *a*(2) above.

(3) Depress any two keylevers simultaneously to check the requirement given in *a*(3) above.

(4) To check the requirement given in *a*(4) above, hold each keylever fully depressed, one at a time, and observe if each associated code lever meets its upstop.

c. Adjustment. Fully depress the CAR RET keylever so that the associated code lever is against its upstop. Rotate the lock ball adjusting screw until a slight resistance is met. Release the CAR RET keylever, and turn the adjusting screw in ¼ turn; tighten the locknut. Check the related adjustment described in paragraph 490.

497. Clutch Shoe Lever Spring Tension
(A, fig. 325)

a. Requirement. When the signal generator

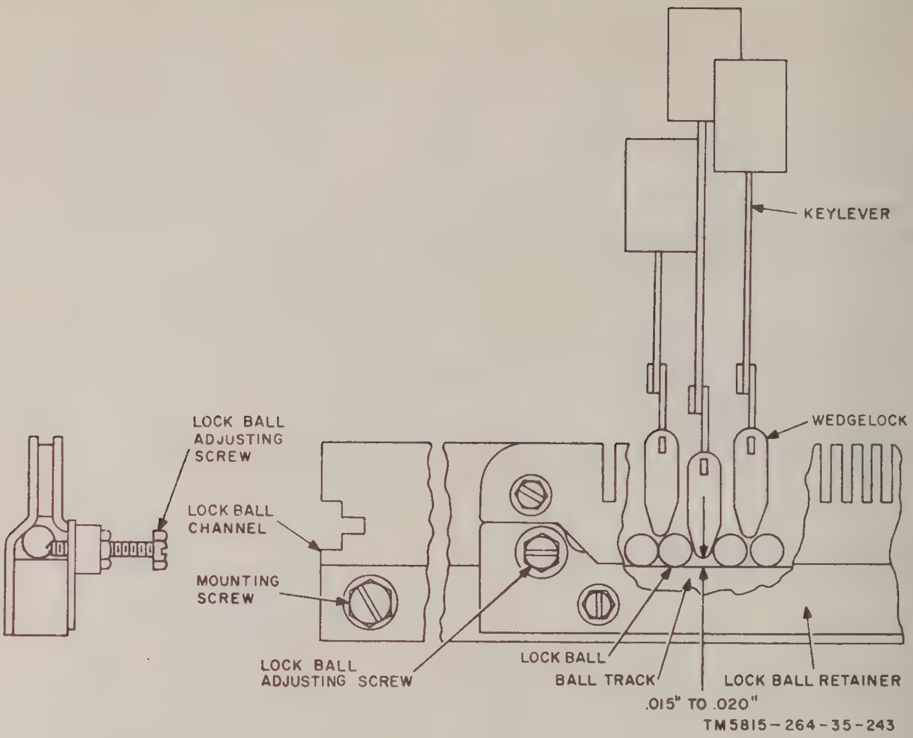


Figure 324. Wedgelock and ball track mechanism.

clutch is engaged and the clutch cam disk is held to prevent turning, it should require 15 to 20 ounces to move the clutch shoe lever in contact with the clutch cam disk stop lug.

b. Method of Checking. Hook a 32-ounce scale on the clutch shoe lever and pull tangent to the clutch.

c. Adjustment. Replace the clutch shoe lever spring if it fails to meet the requirement.

498. Clutch Shoe Spring Tension
(B, fig. 325)

Note. In order to check the spring tension, it is necessary to remove the signal generator clutch from the signal generator main shaft (par. 145*a*). Therefore, it should not be checked unless there is good reason to believe that it does not meet the requirement.

a. Requirement. When the clutch is removed, it should require 3 to 5 ounces to start the primary shoe moving away from the secondary shoe at point of contact.

b. Method of Checking. Hook an 8-ounce scale on the primary shoe and pull tangent to the friction surface.

c. Adjustment. Replace the clutch shoe spring if it fails to meet the requirement. Replace the signal generator clutch and main shaft as described in paragraph 145*d*.

499. Intermediate Gear Bracket Adjustment
(fig. 326)

Note. In order to check the requirement, the typing unit must be mounted on the keyboard base (par. 79*b*).

a. Requirements.

(1) There should be a barely perceptible amount of backlash between the typing unit driven gear and the typing unit driving gear at the point where the backlash is the least.

(2) There should be a barely perceptible amount of backlash between the intermediate driving gear and intermediate

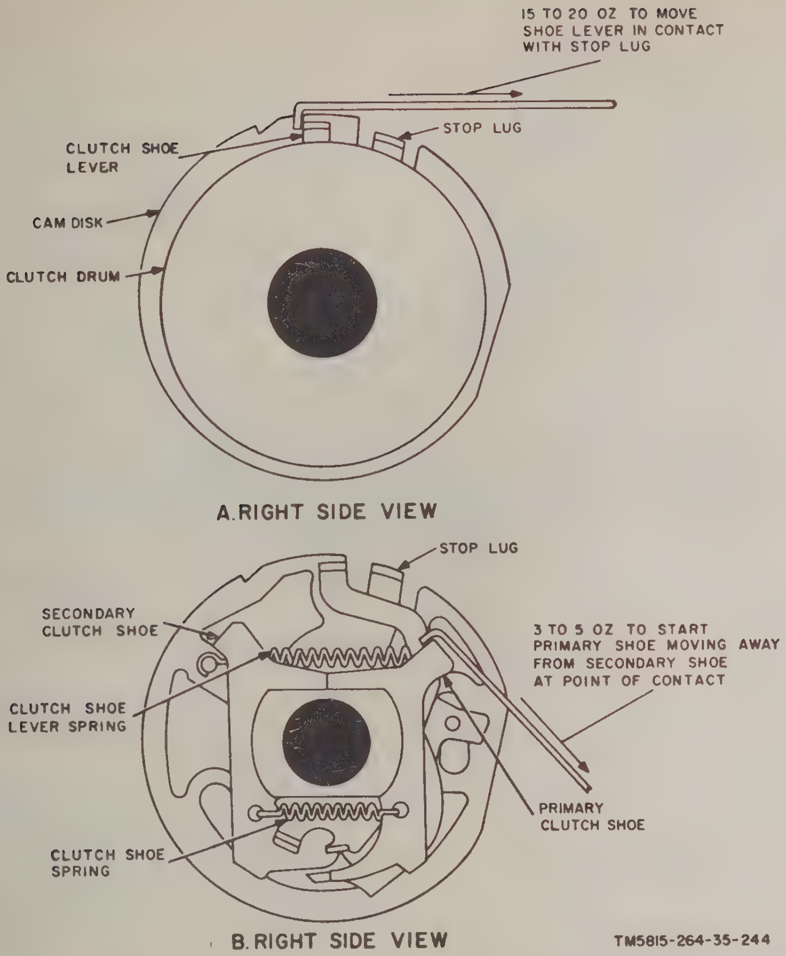

15 TO 20 OZ TO MOVE SHOE LEVER IN CONTACT WITH STOP LUG
STOP LUG
CLUTCH SHOE LEVER
CAM DISK
CLUTCH DRUM
A. RIGHT SIDE VIEW
STOP LUG
SECONDARY CLUTCH SHOE
3 TO 5 OZ TO START PRIMARY SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT
CLUTCH SHOE LEVER SPRING
PRIMARY CLUTCH SHOE
CLUTCH SHOE SPRING
B. RIGHT SIDE VIEW
TM5815-264-35-244

Figure 325. Signal generator clutch mechanism.

driven gear at the point where the backlash is the least.

b. Method of Checking. To check the requirenents given in *a*(1) and (2) above, rotate the notor fan in the normal direction of rotation. During one complete revolution of the internediate driven gear, check the backlash between the typing unit driving and driven gears until the point of least backlash is found. Check the backlash between the intermediate driven and driving gears in the same manner.

c. Adjustments.

(1) Loosen the three hexagon head mounting screws so that the intermediate gear bracket is held friction tight. Insert the blade of a screwdriver in the adjusting slot, at the rear of the bracket, and position the gear assembly to obtain the requirement given in *a*(1) above. Tighten the mounting screws.

(2) Back off the clamping screw at the front end of the intermediate gear bracket. Raise or lower the front end of the bracket by means of the adjusting screw to obtain the requirement given in *a*(2) above. Tighten the clamping screw. Refine this adjust-

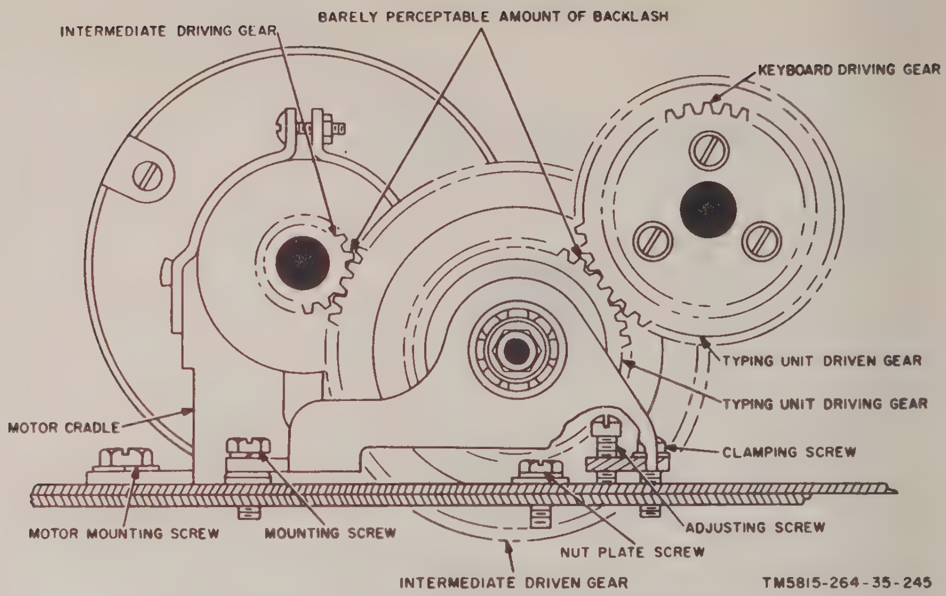

BARELY PERCEPTABLE AMOUNT OF BACKLASH
INTERMEDIATE DRIVING GEAR
KEYBOARD DRIVING GEAR
TYPING UNIT DRIVEN GEAR
TYPING UNIT DRIVING GEAR
MOTOR CRADLE
CLAMPING SCREW
ADJUSTING SCREW
MOTOR MOUNTING SCREW
MOUNTING SCREW
NUT PLATE SCREW
INTERMEDIATE DRIVEN GEAR
TM5815-264-35-245

Figure 326. Motor and typing unit gearing, left side view.

ment and the adjustment described in *c*(1) above, if necessary, to obtain quiet operation with the motor running.

500. Code Bar Reset Bail Spring Tension
(A, fig. 327)

a. Requirement. When the signal generator clutch is disengaged and the code bar reset bail spring is unhooked from the arm on the reset bail, it should require 9 to 11 ounces to pull the code bar reset bail spring to its installed length.

b. Method of Checking. Hook a 32-ounce scale in the spring loop and pull to installed length; remount the spring.

c. Adjustment. Replace the code bar reset bail spring if it fails to meet the requirement.

501. Line Break Lever Spring Tension
(B, fig. 327)

Note. The requirement given below is for the combined code lever and break lever spring.

a. Requirement. It should require 3 to 4 ounces to move the line break switch S7 break lever in contact with the switch plunger, and 6 to 8 ounces of pressure to actuate the lir break switch S7.

b. Method of Checking. Apply the push en of an 8-ounce scale perpendicular to th BREAK keylever and push downward.

c. Adjustment. Replace the line break leve spring and/or the code lever spring if the r quirement cannot be met.

502. Code Lever Spring Tension
(A, fig. 328)

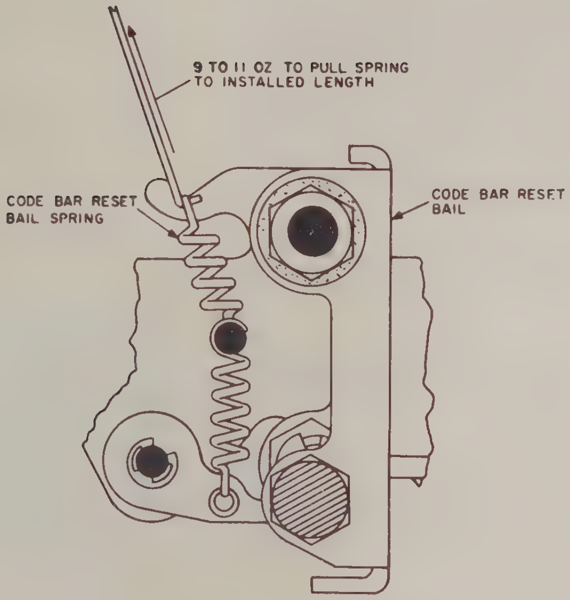
a. Requirements.

(1) It should require a pressure of 1 2 ounces to start the code lev moving downward.

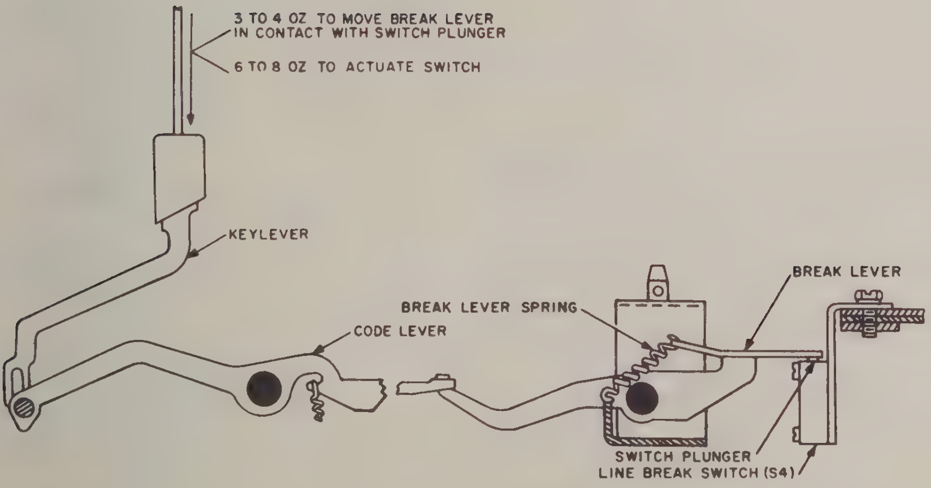
(2) When the keyboard is operated und power and the signal generator clutc is disengaged, it should require pressure of 3 to 5 ounces to opera (trip off) any code selecting keylev including the space bar.

b. Method of Checking.

(1) Apply the push end of an 8-oun scale perpendicular to the keylev and push downward to measure tl


9 TO 11 OZ TO PULL SPRING TO INSTALLED LENGTH
CODE BAR RESET BAIL SPRING
CODE BAR RESET BAIL

A. RIGHT SIDE VIEW


3 TO 4 OZ TO MOVE BREAK LEVER IN CONTACT WITH SWITCH PLUNGER
6 TO 8 OZ TO ACTUATE SWITCH
KEYLEVER
BREAK LEVER
BREAK LEVER SPRING
CODE LEVER
SWITCH PLUNGER
LINE BREAK SWITCH (S4)

B. RIGHT SIDE VIEW

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Figure 327. Code bar reset bail and line break lever.

spring tension given in *a*(1) above. Check the requirement at all code selecting keylevers, including the space bar.

(2) With power on and the signal generator clutch disengaged, apply the push end of an 8-ounce scale perpendicular to the keylever and push downward to measure the spring tension given in *a*(2) above. Check the requirement at all code selecting keylevers, including the space bar.

c. Adjustment. Replace any code lever spring that fails to meet requirements *a*(1) and (2) above.

503. Local Carriage Return Bail Spring Tension
(B, fig. 328)

Note. The requirement given below is for the combined code lever and local carriage return bail spring.

a. Requirement. It should require a pressure of 1 to 3 ounces to start the LOC CR keylever moving downward.

b. Method of Checking. Apply the push end of an 8-ounce scale perpendicular to the keylever and push downward.

c. Adjustment. Replace the code lever spring and/or the local carriage return bail spring if the requirement cannot be met.

504. Transfer Lever Locking Bail Spring Tension
(A, fig. 329)

a. Requirement. When the signal generator clutch is disengaged, and transfer lever locking bail spring is unhooked from its spring post, it should require 5 to 6 ounces to pull the transfer lever locking bail spring to its installed length.

b. Method of Checking. Hook an 8-ounce scale in the spring loop and pull to installed length. Hook the spring back on the post.

c. Adjustment. Replace the transfer lever locking bail spring if it fails to meet the requirement.

505. Transfer Lever Spring Tension
(A, fig. 329)

a. Requirement. It should require 1½ to 2½ ounces to start each transfer lever moving.

b. Method of Checking. Apply the push e of an 8-ounce scale to the top lip of the transf lever and push downward. Check 7 transf lever springs.

c. Adjustment. Replace any transfer lev spring that fails to meet the requirement.

506. Plastic Windows Adjustment
(B, fig. 329)

a. Requirement. The plastic windows each end of the keylever should be fully seat in position, before tightening the mountin screws.

b. Adjustment. With the mounting screw loosened, position the plastic windows; tight the mounting screws.

507. Send-Receive Switch Spring Tension
(fig. 330)

Note. It is necessary to remove the keyboard base order to check this spring tension, and the send-recei switch adjustment (par. 508). Therefore, these adju ments should not be checked unless there is good reas to believe that they do not meet the requirements.

a. Requirement. When the SEND keylev is depressed (keyboard lock bar latched), should require 10 to 15 ounces to start t send-receive switch spring moving.

b. Method of Checking. Hook a 32-oun scale over the end of the nylon button on t end of the switch spring and pull to the right.

c. Adjustment. Replace the send-recei switch if the switch spring fails to meet t requirement.

508. Send-Receive Switch Adjustment
(fig. 330)

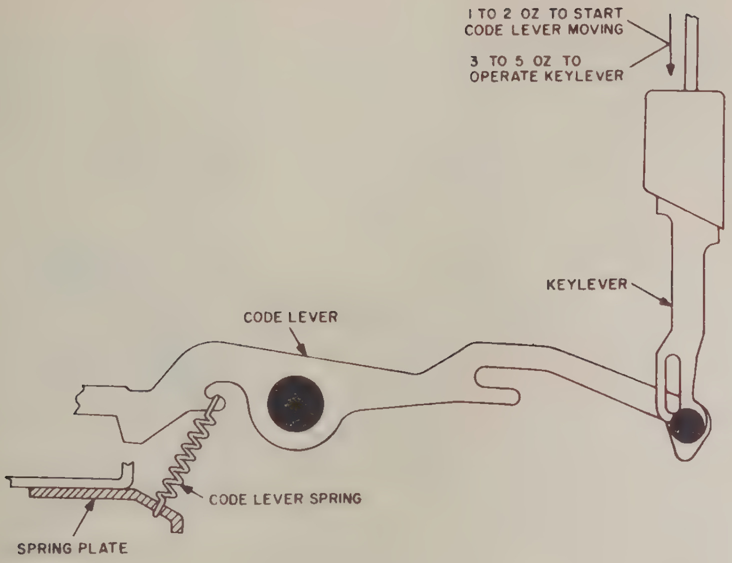
Note. Check the requirement described in paragra 507 before proceeding with this adjustment.

a. Requirements.

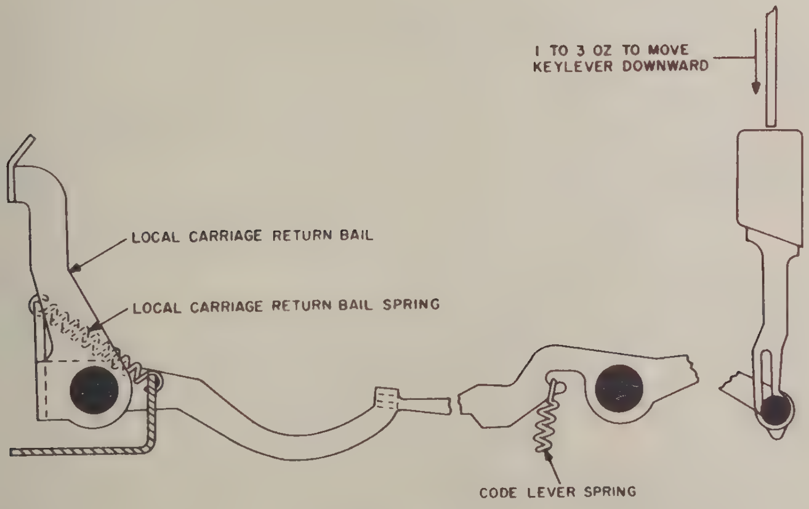
(1) The contact gap of the normally ope contacts (1, 2, and 3), should be least .008 inch when the REC ke lever is depressed.

(2) The contact gap of the normal closed contacts (4) should be least .008 inch when the SEND ke lever is depressed and released.

(3) All contacts should close with som overtravel.


I TO 2 OZ TO START CODE LEVER MOVING
3 TO 5 OZ TO OPERATE KEYLEVER
KEYLEVER
CODE LEVER
CODE LEVER SPRING
SPRING PLATE

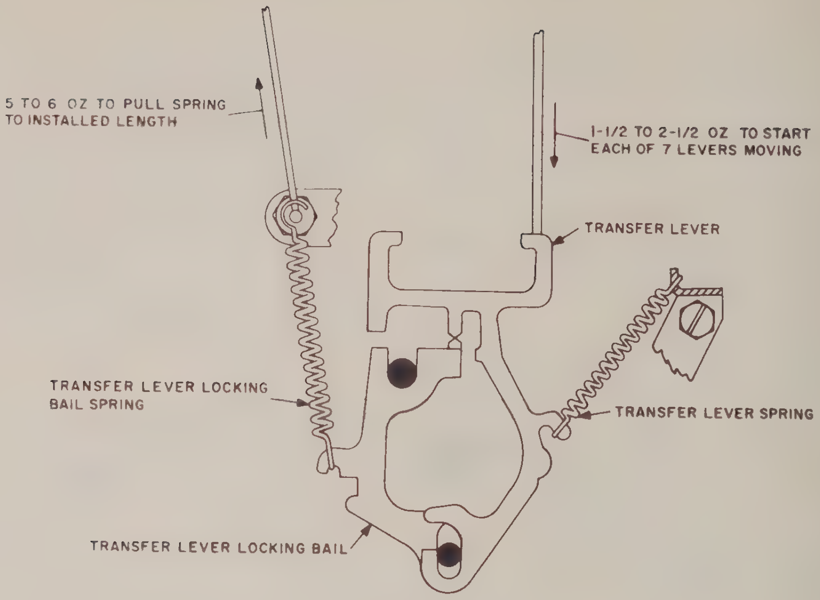
A. LEFT SIDE VIEW


I TO 3 OZ TO MOVE KEYLEVER DOWNWARD
LOCAL CARRIAGE RETURN BAIL
LOCAL CARRIAGE RETURN BAIL SPRING
CODE LEVER SPRING

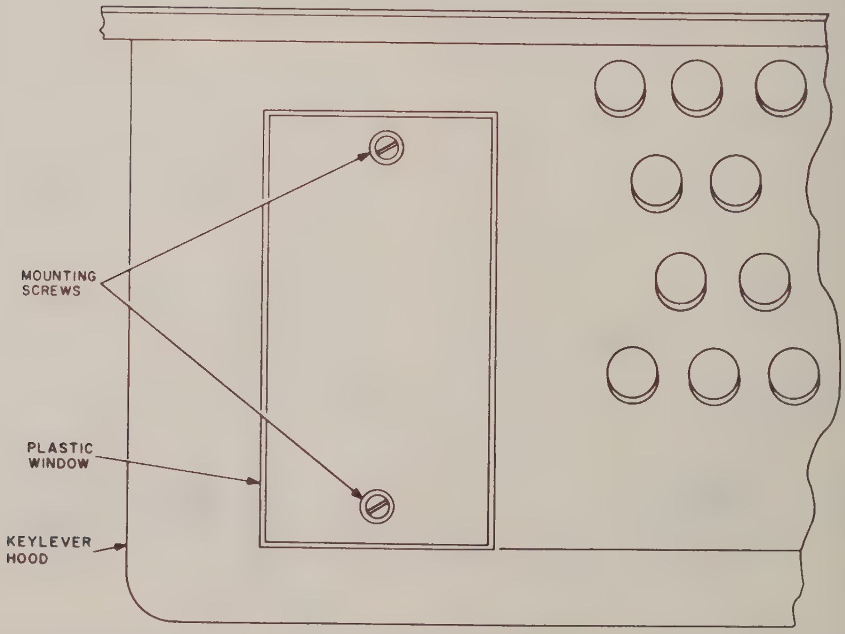
B. LEFT SIDE VIEW

TM5815-264-35-247

Figure 328. Code lever and local carriage return bail mechanisms.


5 TO 6 OZ TO PULL SPRING TO INSTALLED LENGTH
1-1/2 TO 2-1/2 OZ TO START EACH OF 7 LEVERS MOVING
TRANSFER LEVER
TRANSFER LEVER LOCKING BAIL SPRING
TRANSFER LEVER SPRING
TRANSFER LEVER LOCKING BAIL

A. REAR VIEW


MOUNTING SCREWS
PLASTIC WINDOW
KEYLEVER HOOD

B. TOP FRONT VIEW

TM5815-264-35-248

Figure 329. Transfer lever mechanism and plastic window.

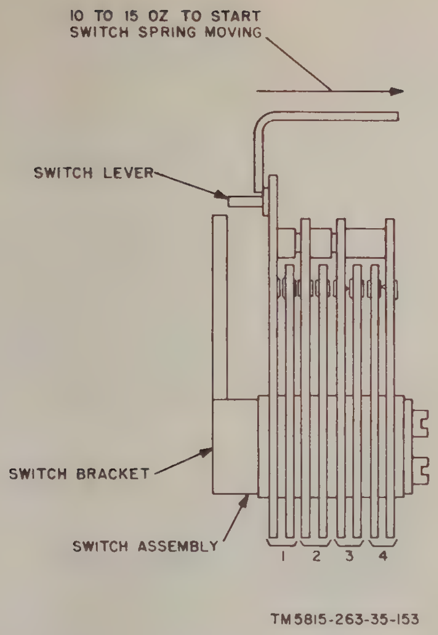


Figure 330. Send-receive switch, bottom view.

b. Method of Checking.

(1) Check the requirements given in *a* (1) and (2) above with a flat feeler gage.

(2) Depress the SEND and REC key-levers alternately, and visually check the closing of all contacts for some overtravel.

c. Adjustment. Bend the contact springs, as required, to obtain the requirements given in *a*(1) through (3) above.

509. Perforator Alignment Adjustment (fig. 331)

a. Requirements.

(1) The punch slide latches should aline with the code bar extensions, and should be within .010 to .020 inch to the right of the code bar extension.

(2) The reset cam should aline with its reset cam follower arm roller approximately .030 inch forward of the rear edge of the roller.

b. Method of Checking. Measure the clearances given in requirements (1) and (2) above with a round wire gage.

c. Adjustment.

(1) Loosen the setscrews on the three couplers; disengage the couplers.

(2) Loosen three mounting screws on the rear bearing bracket.

(3) Loosen two guide (alignment) bracket mounting screws, and three perforator mounting screws.

(4) Position the perforator to obtain the requirements given in *a*(1) and (2) above; tighten the perforator mounting screws.

(5) Position the guide (alignment) bracket so that it contacts the perforator casting for its full length. Make certain that the guide pin, on the perforator base, is in the guide bracket slot; tighten the bracket mounting screws.

(6) Position the rear bearing bracket, to the left or right, until the rear bearing shaft lines up with the perforator drive shaft; tighten the bearing bracket mounting screws.

(7) Slide the three couplers on the shafts; tighten the setscrews.

(8) If necessary, refine the alignment of the punch slide latches and the code bar extensions as follows:

(*a*) Loosen the two mounting screws which fasten the code bar extension guide bracket to the keyboard base.

(*b*) Position the guide bracket to refine the line up of the latches and extensions; tighten the mounting screws.

(9) Check the related adjustment described in paragraph 514.

510. Reset Cam Follower Arm Lever Spring Tension (A, fig. 332)

a. Requirement. When the perforator clutch is disengaged, it should require 12 to 18 ounces to start the reset cam follower arm roller moving away from the reset cam of the perforator unit.

b. Method of Checking. Hook a 32-ounce scale under the reset cam follower arm, just

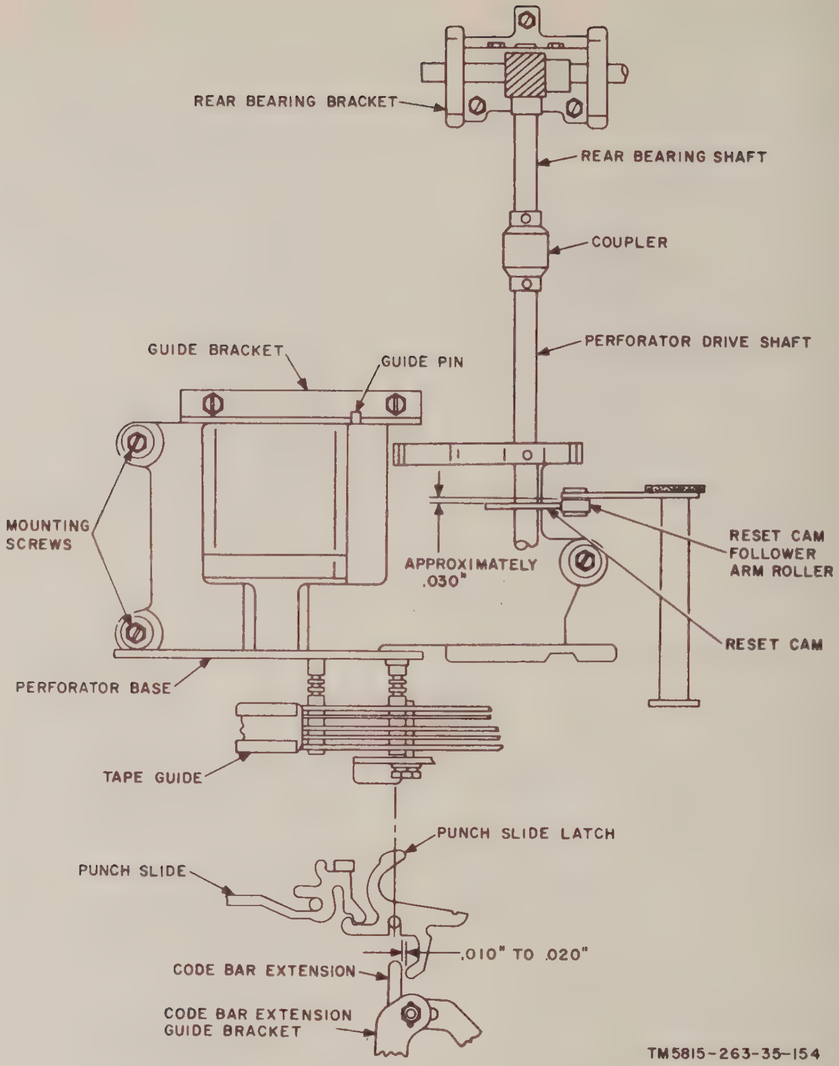

REAR BEARING BRACKET
REAR BEARING SHAFT
COUPLER
PERFORATOR DRIVE SHAFT
GUIDE BRACKET
GUIDE PIN
MOUNTING SCREWS
APPROXIMATELY .030"
RESET CAM FOLLOWER ARM ROLLER
RESET CAM
PERFORATOR BASE
TAPE GUIDE
PUNCH SLIDE LATCH
PUNCH SLIDE
.010" TO .020"
CODE BAR EXTENSION
CODE BAR EXTENSION GUIDE BRACKET
TM5815-263-35-154

Figure 331. Perforator shaft and punch mechanism.

below the roller, and pull at a right angle to the arm.

c. Adjustment. Replace the follower arm lever spring if it fails to meet the requirement.

511. Code Bar Reset Bail Adjustment
(B, fig. 332)

a. Requirement. When the keyboard control knob is in the T position and the code bar reset bail is in the extreme left-hand reset position, there should be .001- to .006-inch clearance between the code bar reset bail latch and code bar reset bail roller.

b. Method of Checking. Measure the clearance given in the requirement with a flat feeler gage.

c. Adjustment. Loosen the lock screw on the eccentric bushing. Position the eccentric bushing to obtain the clearance. Tighten the lock screw, and recheck the requirement.

Note. With all the clutches fully disengaged, depress the LTRS keylever. After the code bars have fallen to the right, there should be .010-inch minimum gap between the reset lever and the pin on the clutch trip bar as measured between the reset cam and roller. If the gap cannot be obtained, reposition the perforator (par. 510) to the right or left and readjust. Check the related adjustment described in paragraph 528.

512. Punch Slide Latch Spring Tension
(fig. 333)

a. Requirement. It should require ¾ to 2 ounces to start each punch slide latch moving.

b. Method of Checking. Apply the push end of an 8-ounce scale perpendicular to the latch; just behind the punch slide, and push downward. Measure the tension of the five latch springs.

c. Adjustment. Replace any punch slide latch spring if it fails to meet the requirement.

513. Code Bar Extension Spring Tension
(fig. 333)

a. Requirement. It should require 4 to 5 ounces to start each code bar extension moving.

b. Method of Checking. Hook an 8-ounce scale over the code bar extension, just above the lower extension of the punch slide latch, and pull to the left. Measure the tension of the five extension springs.

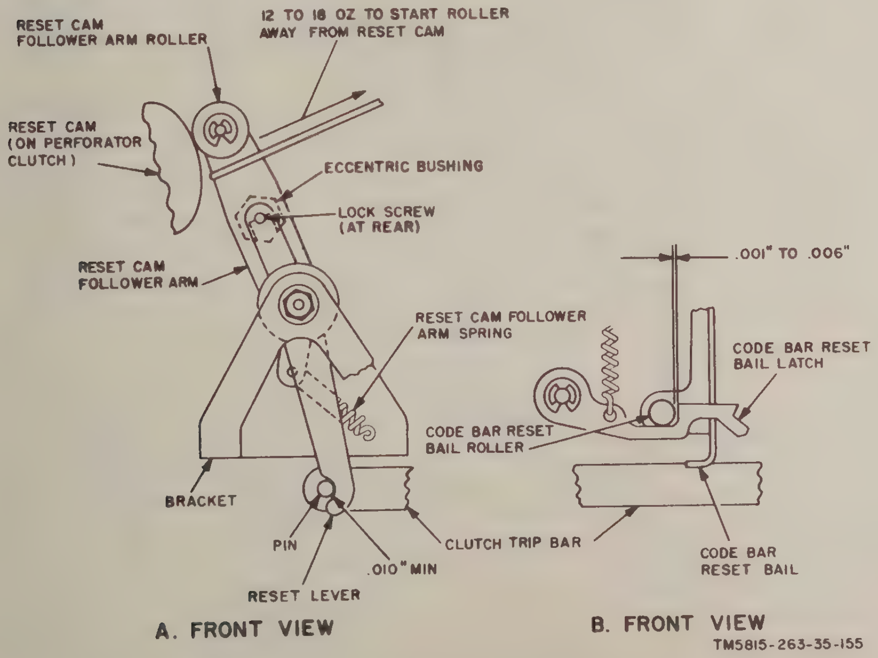
c. Adjustment. Replace any code bar extension spring if it fails to meet the requirement.

514. Code Bar Extension and Punch Slide Latch Adjustment
(fig. 333)

a. Requirements.

(1) With the keyboard control knob in the T position; the blank keylever depressed, and the punch slides latched, there should be .001- to .006-inch clearance, between the code bar extensions and the closest punch slide latch.

(2) When the LTRS keylever is depressed, the code bar extensions should rotate the punch slide latches to release all punch slides.


RESET CAM FOLLOWER ARM ROLLER
12 TO 16 OZ TO START ROLLER AWAY FROM RESET CAM
RESET CAM (ON PERFORATOR CLUTCH)
ECCENTRIC BUSHING
LOCK SCREW (AT REAR)
RESET CAM FOLLOWER ARM
RESET CAM FOLLOWER ARM SPRING
BRACKET
PIN
.010" MIN
RESET LEVER
CLUTCH TRIP BAR
.001" TO .006"
CODE BAR RESET BAIL LATCH
CODE BAR RESET BAIL ROLLER
CODE BAR RESET BAIL
TM5815-263-35-155

A. FRONT VIEW

B. FRONT VIEW

Figure 332. Code bar reset bail and cam follower mechanisms.

b. Method of Checking. Measure the clearance given in *a*(1) above with a flat feeler gage.

c. Adjustment. Loosen the guide locknut. Position the guide vertically to obtain the clearance given in *a*(1) above; tighten the locknut.

515. Code Bar Extension Blocking Assembly Adjustment

(A, fig. 334)

a. Requirements. The code bar extensions and character counter code bars should not operate when the keyboard control knob is in the K position, and the following requirements should be met:

(1) There should be .001- to .015-inch clearance, between the right end of the code bar extensions and the code bars.

(2) There should be .001- to .008-inch clearance, between the blocking lever and the side of the notch in the character counter code bars.

b. Method of Checking. Measure the clearances given in *a*(1) and (2) above with a round wire gage.

c. Adjustment.

(1) With the signal generator clutch disengaged, turn the keyboard control knob to the K position.

(2) Depress the LTRS keylever and rotate the signal generator shaft to return the code bars to the extreme left.

(3) Loosen the adjusting screw on the blocking lever to friction tightness.

(4) Position the blocking bail to obtain the clearance given in requirement *a* (1), and position the blocking lever to obtain the clearance given in *a*(2)

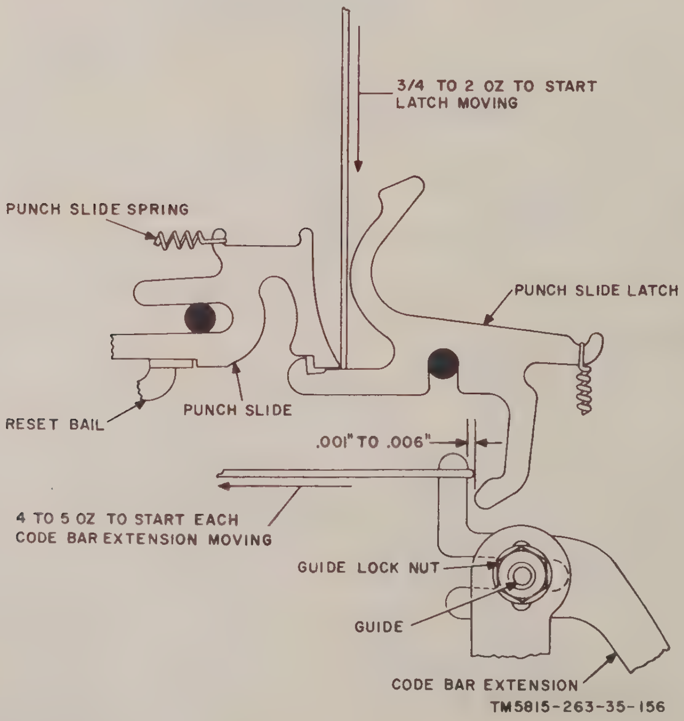

3/4 TO 2 OZ TO START LATCH MOVING
PUNCH SLIDE SPRING
PUNCH SLIDE LATCH
RESET BAIL
PUNCH SLIDE
.001" TO .006"
4 TO 5 OZ TO START EACH CODE BAR EXTENSION MOVING
GUIDE LOCK NUT
GUIDE
CODE BAR EXTENSION
TM5815-263-35-156

Figure 333. Code bar extension and punch latch mechanisms, front view.

above; tighten the adjusting screw. Make certain that the blocking bail is free to move on its guide post.

(5) With power on, test operation with the keyboard control knob in the K, K–T, and T positions.

516. Code Bar Blocking Bail Spring Tension
(A, fig. 334)

a. Requirement. When the keyboard control knob is in the K–T position, it should require 7 ounces to start the blocking bail moving.

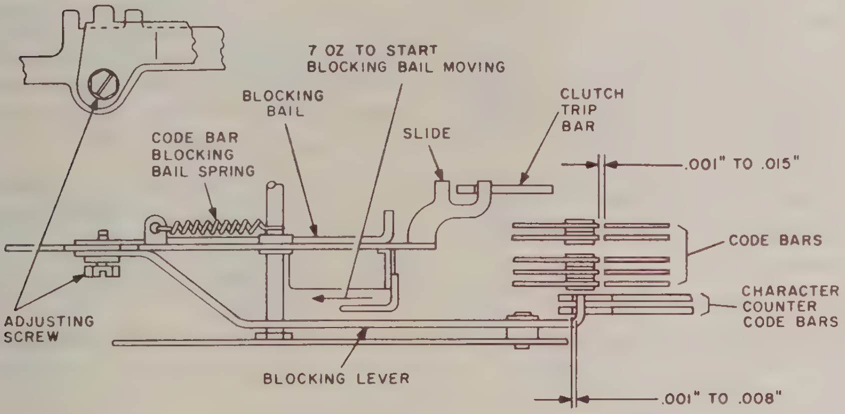
b. Method of Checking. Hook an 8-ounce scale over the end of the blocking bail and pull to the left.

c. Adjustment. Replace the code bar extension bail spring if it fails to meet the requirement.

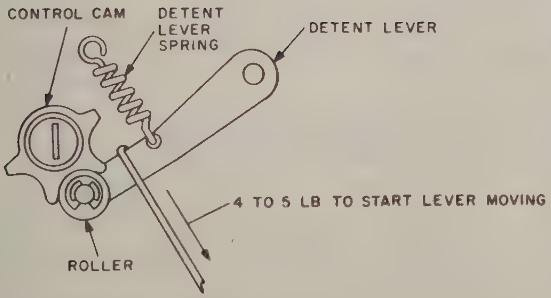
517. Detent Lever Spring Tension
(B, fig. 334)

a. Requirement. It should require 4 to 5 pounds to start the detent lever moving.

b. Method of Checking. Hook a 12-pound


7 OZ TO START BLOCKING BAIL MOVING
BLOCKING BAIL
CLUTCH TRIP BAR
CODE BAR BLOCKING BAIL SPRING
SLIDE
.001" TO .015"
CODE BARS
CHARACTER COUNTER CODE BARS
ADJUSTING SCREW
BLOCKING LEVER
.001" TO .008"

A. TOP VIEW


CONTROL CAM
DETENT LEVER SPRING
DETENT LEVER
4 TO 5 LB TO START LEVER MOVING
ROLLER

B. FRONT VIEW

TM5815-263-35-157

Figure 334. Code bar extension and detent lever mechanism.

scale over the detent lever, to the left of the roller, and pull downward.

c. Adjustment. Replace the detent lever spring if it fails to meet the requirement.

518. Cam Follower Spring Tension
(fig. 335)

a. Requirement. It should require 3 to 5 ounces to start the reset cam follower moving.

b. Method of Checking. Hook an 8-ounce scale over the reset cam follower, just to the left of the cam follower spring, and pull downward.

c. Adjustment. Replace the cam follower spring if it fails to meet the requirement.

519. Reset Lever Spring Tension
(fig. 335)

a. Requirement. When the keyboard control knob is in the T position, it should require 3 to 5 ounces to start the reset lever moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the bottom of the reset lever, just to the right of cam follower spring, and push upward.

c. Adjustment. Replace the reset lever spring if it fails to meet the requirement.

520. End-of-Line Indicator Selector Switch Spring Tension
(fig. 335)

a. Requirement. When the keyboard control knob is in the T position, it should require 1 to 2 ounces to separate the contacts.

b. Method of Checking. Hook an 8-ounce scale over the end of the switch spring at the nylon insulating button and pull downward.

c. Adjustment. Replace the end-of-line indicator selector switch if it fails to meet the requirement.

521. Character Counter End-of-Line Indicator Switch Adjustment

Note. It will be necessary to remove the character counter in order to check the requirements given below, and the spring tensions given in paragraphs 522 and 523. Remove the character counter as described in paragraph 159*a*. After the adjustments have been made, refer to paragraph 159*d* for replacement of unit.

a. Requirements.

(1) The end-of-line indicator switch S9 (A, fig. 336) should close at a preset number of characters, with a small amount of overtravel by both contact springs.

(2) When the high part of the switch cam

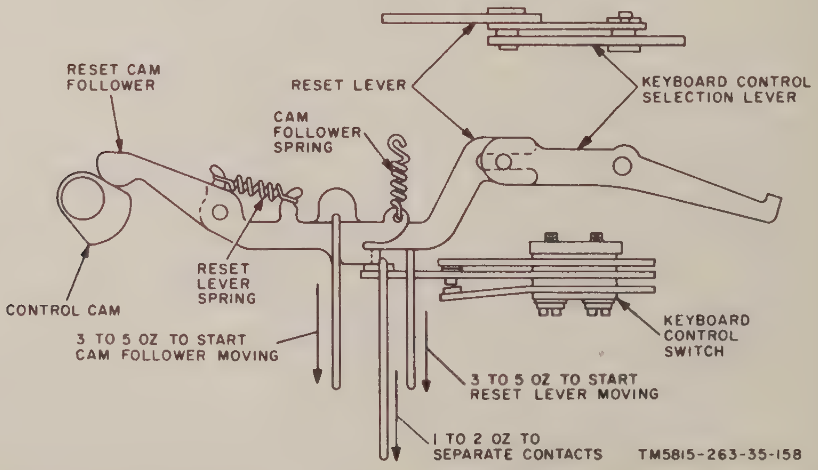

RESET CAM FOLLOWER
RESET LEVER
CAM FOLLOWER SPRING
KEYBOARD CONTROL SELECTION LEVER
RESET LEVER SPRING
CONTROL CAM
3 TO 5 OZ TO START CAM FOLLOWER MOVING
KEYBOARD CONTROL SWITCH
3 TO 5 OZ TO START RESET LEVER MOVING
1 TO 2 OZ TO SEPARATE CONTACTS
TM5815-263-35-158

Figure 335. Reset cam follower and keyboard control selector mechanism, front view.

is toward the right, there should be .012- to .025-inch clearance between the upper part of the long contact spring and the low part of the switch cam.

b. Method of Checking.

(1) To check the requirement given in *a* (1) above, turn the ratchet drum (fig. 338) until the indicator traverses the entire scale. Observe closing of switch on preset count and overtravel of both contact springs.

(2) Turn the ratchet drum (fig. 338) until the high part of the switch cam is toward the right. Measure the clearance given in requirements *a*(2) above, with a round wire gage.

c. Adjustments.

(1) Loosen the mounting screws on the switch bracket to friction tightness. Position the bracket to obtain the clearance given in *a*(1) above; tighten the mounting screws.

(2) Loosen the clamp screws of the switch cam to friction tightness. Set the indicator to the desired count. Adjust the cam until the indicator switch just closes with some overtravel; tighten the clamp screws.

522. Ratchet Drum Assembly Return Spring Tension

(A, fig. 336)

a. Requirements.

(1) When the indicator points to 0 (zero), it should require 1½ to 2½ ounces to start the eyelet moving.

(2) When the indicator points to 70, it should require 3½ to 6½ ounces to start the eyelet moving.

b. Method of Checking.

(1) With the indicator set on zero, hook an 8-ounce scale in the eyelet of the indicator cord and pull to the right to check the requirement given in *a*(1) above.

(2) With the indicator set on 70, hook an 8-ounce scale in the eyelet of the indicator cord and pull to the right to check the requirement given in *a*(2) above.

c. Adjustment. Replace the ratchet return spring if it fails to meet the requirement.

523. Character Counter Scale Bracket Adjustment

a. Requirement. The indicator (B, fig. 336) should rest lightly on the bracket for its full travel from 0 to 85.

b. Method of Checking. Turn the ratchet drum (fig. 338) and observe that the indicator rests lightly on its bearing edge as it moves across the full length of the scale.

c. Adjustment. Loosen the lock screws (B, fig. 336), at each end of the bracket to friction tightness. Position the bracket up or down until the bracket is level and the indicator rests lightly on its bearing edge when it traverses across the scale. The upper part of the indicator cord should remain in a straight line after the adjustment has been made, this indicates that no additional strain has been added at this point; tighten the lock screws.

524. Character Counter Idler Pulley Adjustment

(A, fig. 337)

a. Requirement. The indicator cord should have enough tension to prevent it from sagging.

b. Adjustment. Loosen the lock screw on the adjusting stud. Position the pulley starting from the left or point of maximum slack. Move the pulley to the right until the slack in the cord just disappears; tighten the lock screw.

Note. Hold the drive lever and latch lever out of engagement with the ratchet drum and rotate the ratchet drum to make sure that it does not bind in its bearing.

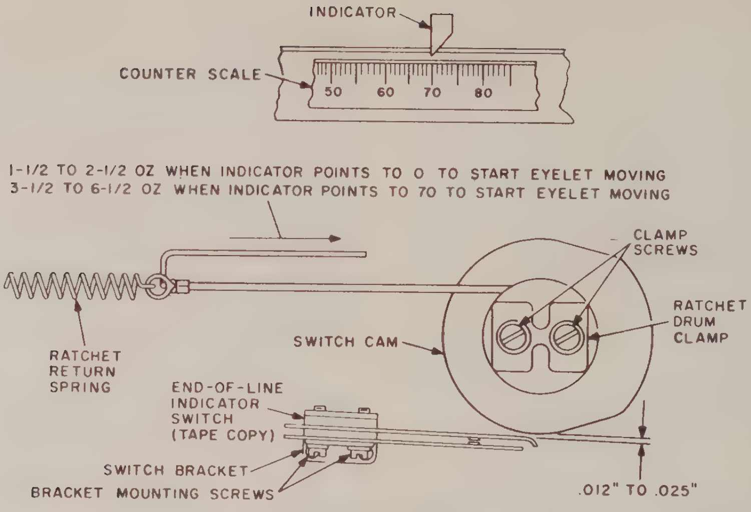
525. Stop Lever Adjustment

(A, fig. 337)

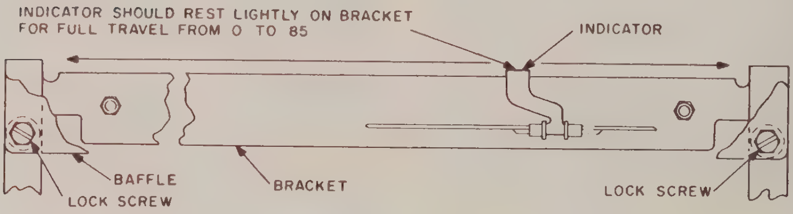
a. Requirements.

(1) When the ratchet drum is fully returned and resting against its stop lever, there should be .002- to .010-inch clearance between the latch lever and the face of the fourth ratchet tooth.

(2) The anti-bounce latch, in its nonoperated position, should not inter-


INDICATOR
COUNTER SCALE
50
60
70
80
1-1/2 TO 2-1/2 OZ WHEN INDICATOR POINTS TO 0 TO START EYELET MOVING
3-1/2 TO 6-1/2 OZ WHEN INDICATOR POINTS TO 70 TO START EYELET MOVING
CLAMP SCREWS
RATCHET DRUM CLAMP
SWITCH CAM
RATCHET RETURN SPRING
END-OF-LINE INDICATOR SWITCH (TAPE COPY)
SWITCH BRACKET
BRACKET MOUNTING SCREWS
.012" TO .025"

A. FRONT VIEW


INDICATOR SHOULD REST LIGHTLY ON BRACKET FOR FULL TRAVEL FROM 0 TO 85
INDICATOR
BAFFLE
LOCK SCREW
BRACKET
LOCK SCREW

B. REAR VIEW

TM5815-263-35-159

Figure 336. Character counter mechanism.

fere with the free rotation of the ratchet drum.

b. Method of Checking.

(1) With the ratchet drum fully returned and resting against its stop lever, measure the clearance given in *a*(1) above with a flat feeler gage.

(2) To check the requirement given in *a* (2) above, rotate the ratchet drum through its full travel.

c. Adjustment. Loosen the lock screw on the eccentric bushing to friction tightness. Hold the drive lever out of engagement with the ratchet drum and adjust the eccentric bushing until the clearance given in *a*(1) above is obtained; tighten the lock screw.

526. Anti-Bounce Spring Tension (A, fig. 337)

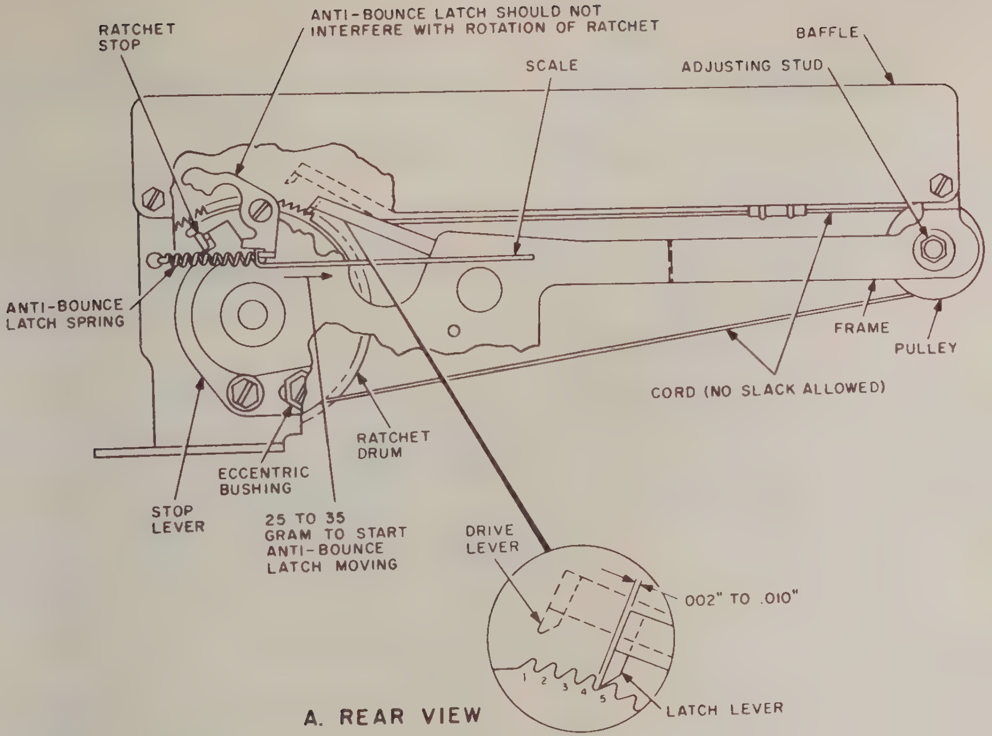
a. Requirement. When the anti-bounce latch is resting against the stop lever it should require 25 to 35 grams to start the anti-bounce latch moving.

b. Method of Checking. Hook a 60-gram scale to the spring hook position of the anti-bounce latch and pull away from the latch.

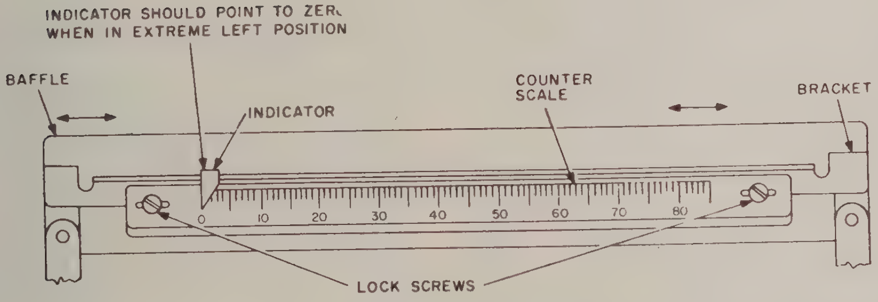
c. Adjustment. Replace the anti-bounce latch spring if it fails to meet the requirement.

527. Character Counter Scale Adjustment (B, fig. 337)

a. Requirement. When the indicator is at


RATCHET STOP
ANTI-BOUNCE LATCH SHOULD NOT INTERFERE WITH ROTATION OF RATCHET
BAFFLE
SCALE
ADJUSTING STUD
ANTI-BOUNCE LATCH SPRING
FRAME
PULLEY
CORD (NO SLACK ALLOWED)
RATCHET DRUM
ECCENTRIC BUSHING
STOP LEVER
25 TO 35 GRAM TO START ANTI-BOUNCE LATCH MOVING
DRIVE LEVER
002" TO .010"
1
2
3
4
5
LATCH LEVER

A. REAR VIEW


INDICATOR SHOULD POINT TO ZERO WHEN IN EXTREME LEFT POSITION
BAFFLE
INDICATOR
COUNTER SCALE
BRACKET
0
10
20
30
40
50
60
70
80
LOCK SCREWS

B. FRONT VIEW

TM5815-263-35-160

Figure 337. Character counter mechanism.

the extreme left of the counter scale it should point to zero.

b. Adjustment. Set indicator to the left. Loosen the lock screws and position the scale; tighten the lock screws.

528. Character Counter Stroke Adjustment
(fig. 338)

a. Requirement. When the keyboard control knob is in the K–T position, the character counter mechanism should operate consistently

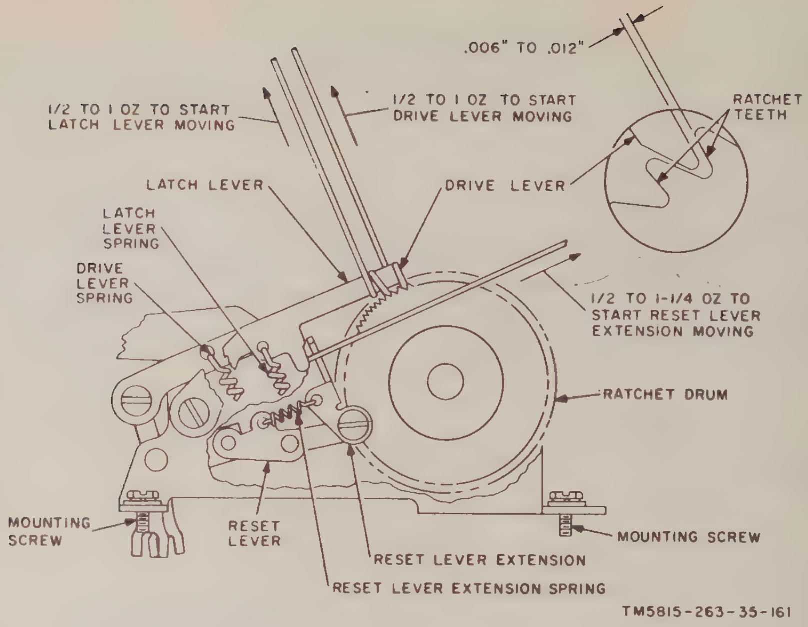

.006" TO .012"
1/2 TO 1 OZ TO START LATCH LEVER MOVING
1/2 TO 1 OZ TO START DRIVE LEVER MOVING
RATCHET TEETH
LATCH LEVER
DRIVE LEVER
LATCH LEVER SPRING
DRIVE LEVER SPRING
1/2 TO 1-1/4 OZ TO START RESET LEVER EXTENSION MOVING
RATCHET DRUM
MOUNTING SCREW
RESET LEVER
MOUNTING SCREW
RESET LEVER EXTENSION
RESET LEVER EXTENSION SPRING
TM5815-263-35-161

Figure 338. Character counter mechanism, front view.

when a character and REPT keylever are held depressed. When the CAR RET keylever is depressed, the character counter should reset without binding. The counter mechanism should count the first character on a restart after reset condition. When the counter is set near the midpoint of its range, there should be .006- to .012-inch clearance between the drive lever and ratchet tooth.

b. Method of Checking. With the counter set near the midpoint of its range, measure the clearance given in the requirements with a round wire gage.

c. Adjustment. Loosen the two mounting screws to friction tightness. Turn the keyboard control knob to the T position. Start the motor and depress the CAR RET keylever and then the E keylever. Turn off the motor. Depress the E keylever and adjust the position of the character frame until the clearance given in the requirement is obtained; tighten the mounting screws. Turn on the motor and depress the E and REPT keylevers simultaneously. The counter should step smoothly without slipping. Depress the CAR RET keylever and check the resetting operation. Turn the keyboard control knob to the K–T position and repeat the above check. Refine the adjustment as necessary to obtain operational requirements.

529. Reset Lever Extension Spring Tension
(fig. 338)

a. Requirement. It should require ½ to 1¼ ounces to start the reset lever extension moving.

b. Method of Checking. Hook an 8-ounce scale over the end of the reset lever extension and pull to the right.

c. Adjustment. Replace the reset lever extension spring if it fails to meet the requirement.

530. Latch Lever Spring Tension
(fig. 338)

a. Requirement. It should require ½ to 1 ounce to start the latch lever moving.

b. Method of Checking. Hook an 8-ounce scale under the latch lever at its right end and pull upward.

c. Adjustment. Replace the latch lever spring if it fails to meet the requirement.

531. Drive Lever Spring Tension
(fig. 338)

a. Requirement. It should require ½ to 1 ounce to start the drive lever moving.

b. Method of Checking. Hook an 8-ounce scale under the drive lever at its right end and pull upward.

c. Adjustment. Replace the drive lever spring if it fails to meet the requirement.

Section XXI. ADJUSTMENT OF ELECTRICAL SERVICE UNITS

532. General

This section contains the requirements and adjustments for the main electrical service unit, and the reperforator electrical service unit.

533. Main Electrical Service Unit

To facilitate checking the adjustment requirements, the main electrical service unit should be removed from the cabinet, then replaced after the adjustments have been made.

a. Removal. Remove the main electrical service unit as described in paragraph 83*a*.

b. Replacement. Replace the main electrical service as described in paragraph 83*b*.

534. Motor Control Assembly Adjustment
(fig. 339)

a. Stop Armature Spring Tension.

(1) *Requirement.* It should require 4½ to 6 ounces to pull the stop armature spring to its installed length.

(2) *Method of checking.* With the stop armature latched on the stop armature, unhook the stop armature spring from the motor control frame. Hook an 8-ounce scale in the spring loop and pull to installed length; hook the armature spring back on the frame.

(3) *Adjustment.* Replace the stop armature spring if it fails to meet the requirement.

b. Intermediate Lever Spring Tension.

(1) *Requirement.* When the stop and start armatures are held against their cores, it should require 10 to 20 grams to start the intermediate lever moving.

(2) *Method of checking.* With the start and stop armatures held against their cores, apply a 70-gram fan type scale to the underside of the intermediate lever just to the right of its downward extension and push upward.

(3) *Adjustment.* Replace the intermediate spring if it fails to meet the requirement.

c. Start Armature Spring Tension.

(1) *Requirement.* When the stop armature is in the attracted position and the intermediate lever is held upward, it should require 2½ to 4 ounces to hold the start armature against the start magnet cores.

(2) *Method of checking.* With the stop armature in its attracted position and the intermediate lever held upward, apply the push end of an 8-ounce scale to the start armature, at the right of the intermediate lever lower extension, and push downward.

(3) *Adjustment.* Replace the start armature spring if it fails to meet the requirement.

d. Start Magnet Core Adjustment.

(1) *Requirement.* When the stop armature is in the unattracted position, there should be .003- to .006-inch clearance between the start magnet core and the anti-freeze rivet on the start armature.

(2) *Method of checking.* With the stop armature in its unattracted position, measure the clearance given in the requirement with a flat feeler gage.

(3) *Adjustment.* Turn the electrical service unit upside down and loosen the locknut on each start magnet core. Insert a screwdriver blade in the adjusting slot advance or retard each core to obtain the requirement. Tighten the locknuts.

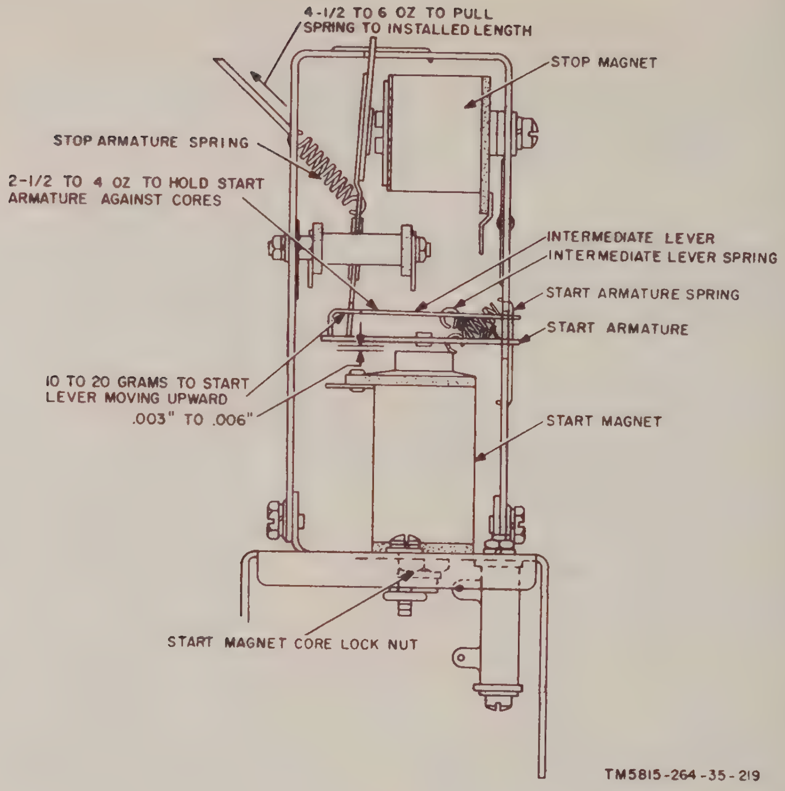

4-1/2 TO 6 OZ TO PULL SPRING TO INSTALLED LENGTH
STOP MAGNET
STOP ARMATURE SPRING
2-1/2 TO 4 OZ TO HOLD START ARMATURE AGAINST CORES
INTERMEDIATE LEVER
INTERMEDIATE LEVER SPRING
START ARMATURE SPRING
START ARMATURE
10 TO 20 GRAMS TO START LEVER MOVING UPWARD
.003" TO .006"
START MAGNET
START MAGNET CORE LOCK NUT
TM5815-264-35-219

Figure 339. Motor control assembly, rear view.

535. Line Relay Adjustment

Refer to TM 11–2513 for operating instructions for Test Set I–193–A which is used for adjusting the line relay K2.

536. Reperforator Electrical Service Unit

Refer to TM 11–2513 for operating instructions for Test Set I–193–A which is used for adjusting the line relay K5.

Section XXII. ADJUSTMENT OF TRANSMITTER DISTRIBUTOR

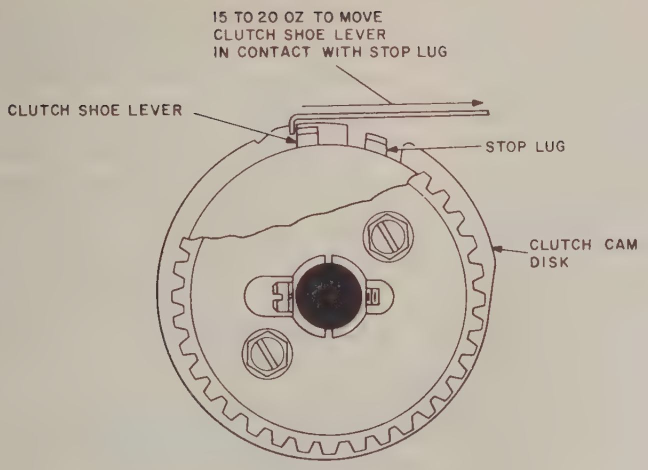
537. General

This section contains the tolerance requirements, adjustment procedures, and spring tension checks for the transmitter distributor. Adjustment procedures are arranged in a proper sequence for a complete readjustment of the transmitter distributor. When making individual adjustments, check all related adjustments. Where it is necessary to remove parts or subassemblies to make an adjustment, reference is made to specific paragraphs for removal an replacement instructions.

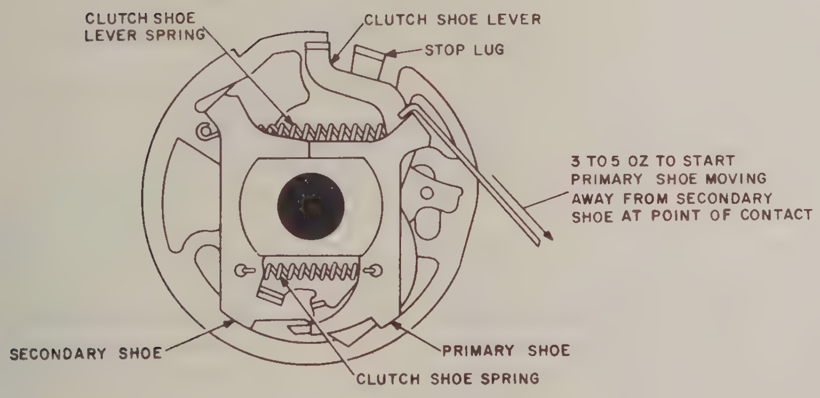
538. Clutch Shoe Lever Spring Tension (A, fig. 340)

a. Requirement. It should require 15 to 20 ounces to move the clutch shoe lever in contact with the stop lug on the clutch cam disk.

b. Method of Checking. Invert the unit, disengage the clutch and rotate the main shaft until the clutch shoe lever and stop lug on the clutch cam disk are in the upward position. Hold the clutch cam disk to prevent turning. Hook a 32-ounce scale on the clutch shoe lever and pull at a tangent to the clutch drum.


15 TO 20 OZ TO MOVE
CLUTCH SHOE LEVER
IN CONTACT WITH STOP LUG
CLUTCH SHOE LEVER
STOP LUG
CLUTCH CAM
DISK

A. FRONT VIEW


CLUTCH SHOE
LEVER SPRING
CLUTCH SHOE LEVER
STOP LUG
3 TO 5 OZ TO START
PRIMARY SHOE MOVING
AWAY FROM SECONDARY
SHOE AT POINT OF CONTACT
SECONDARY SHOE
PRIMARY SHOE
CLUTCH SHOE SPRING

B. FRONT VIEW

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Figure 340. Clutch mechanism.

c. Adjustment. Replace the clutch shoe lever spring if it fails to meet the requirement.

539. Clutch Shoe Spring Tension
(B, fig. 340)

Note. In order to check this spring tension it is necessary to remove the clutch from the main shaft; therefore, it should not be checked unless it is believed that the spring does not meet the requirement.

a. Requirement. It should require from 3 to 5 ounces to start the primary shoe moving away from the secondary shoe at point of contact.

b. Method of Checking. Remove the main shaft assembly (par. 181*a*), remove the clutch from the main shaft (par. 181*b*) and apply an 8-ounce scale to the primary shoe tangent to the friction surface and pull to measure the force. Replace the clutch on the main shaft (par. 181*c*) and replace the main shaft assembly (par. 181*d*).

c. Adjustment. Replace the clutch shoe spring if it fails to meet the requirement.

540. Clutch Trip Lever Adjustment
(A, fig. 341)

a. Requirement. With the clutch cam disk stop lug and the clutch trip lever opposite each other the clearance between them, when the play is taken up to make the clearance a maximum, should be .012 to .025 inch.

b. Method of Checking. Invert the transmitter distributor. Disengage the clutch and rotate the main shaft until the clutch trip lever is opposite the clutch cam disk stop lug. Check the above clearance with a round wire gage.

c. Adjustment. Remove the cover plate (par. 178*a*). Slightly loosen the clamp nut on the clutch trip bail eccentric and rotate the eccentric to its lowest point. Insert a screwdriver into the eccentric slot and rotate the eccentric until the above requirement is met. Tighten the clamp nut and recheck the requirement. Replace the cover plate by reversing the procedures used in removal (par. 178*a*).

541. Clutch Shoe Lever Adjustment
(B, fig. 341)

a. Requirement. With the clutch engaged, the clearance between the clutch shoe lever and the clutch cam disk stop lug should be .055- to .085-inch greater than the clearance obtained with the clutch disengaged.

b. Method of Checking. Disengage the clutch and check the clearance between the clutch shoe lever and the clutch cam disk stop lug. Hook a 32-ounce scale over the clutch shoe lever and pull opposite the stop lug with a force of 24 ounces. Release the pressure slowly to engage the clutch and check the clearance between the clutch shoe lever and clutch cam disk stop lug. The difference between the engaged clearance and the disengaged clearance must be as indicated in the requirement.

c. Adjustment. Loosen the two clamp screws on the clutch cam disk. Place a wrench over the stop lug and rotate the clutch cam disk until the requirement is met. Tighten the clamp screws and recheck the requirement.

Caution: **Make sure that the clutch drum does not drag on the shoes when the clutch is disengaged and the drum is rotated in its normal direction. Refine the above adjustment to correct shoe drag.**

542. Clutch Latch Lever Spring Tension
(A, fig. 341)

a. Requirement. With the clutch latch lever on the low part of the clutch cam disk, it should require 3 to 5½ ounces to start the clutch latch lever moving.

b. Method of Checking. Hook an 8-ounce scale over the spring extension of the clutch latch lever and pull horizontally to the right.

c. Adjustment. Replace the clutch latch lever spring if it fails to meet the requirement.

543. Clutch Trip Lever Spring Tension
(A, fig. 341)

a. Requirement. When the clutch is engaged, it should require 7 to 10½ ounces to start the clutch trip lever moving.

b. Method of Checking. Hook a 32-ounce scale over the top of the clutch trip lever and pull horizontally to the right.

c. Adjustment. Replace the clutch trip lever spring, if it fails to meet the requirement.

544. Clutch Trip Magnet Adjustment
(fig. 342)

a. Requirement.

(1) In the energized position, the top end of the armature (A) should contact the upper magnet core face and there should be .001- to .004-inch clearance between the armature and lower magnet core face, at the point of least clearance, when the play is taken up to make the clearance a maximum.

(2) With the high part of the backstop eccentric towards the top of the assembly, the clearance between the armature bail and the backstop eccentric should be .045 to .055 inch.

(3) When the clutch is disengaged, there should be .007- to .015-inch clearance between the end of the armature bail extension (B) and the main bail trip lever.

b. Method of Checking.

(1) Remove the cover plate (par. 178*a*). Hold the armature (A) in its energized position and check the top end of the armature visually, and the

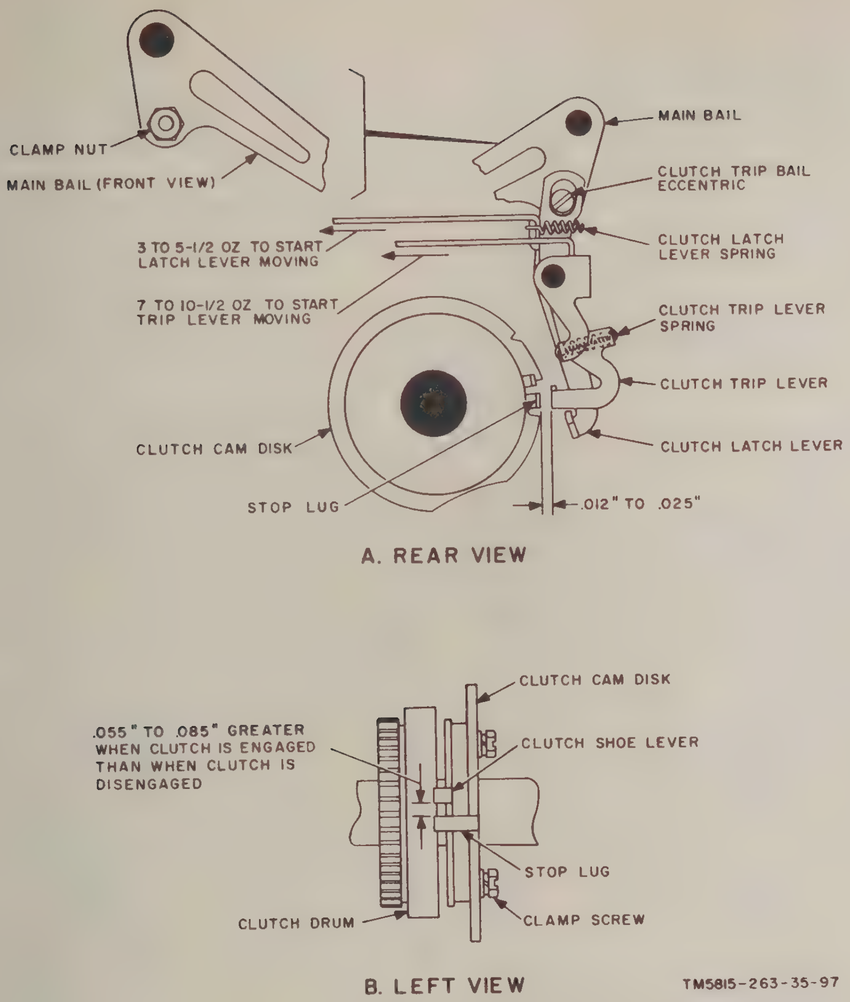

CLAMP NUT
MAIN BAIL (FRONT VIEW)
MAIN BAIL
CLUTCH TRIP BAIL ECCENTRIC
3 TO 5-1/2 OZ TO START LATCH LEVER MOVING
CLUTCH LATCH LEVER SPRING
7 TO 10-1/2 OZ TO START TRIP LEVER MOVING
CLUTCH TRIP LEVER SPRING
CLUTCH TRIP LEVER
CLUTCH CAM DISK
CLUTCH LATCH LEVER
STOP LUG
.012" TO .025"
A. REAR VIEW
CLUTCH CAM DISK
.055" TO .085" GREATER WHEN CLUTCH IS ENGAGED THAN WHEN CLUTCH IS DISENGAGED
CLUTCH SHOE LEVER
STOP LUG
CLUTCH DRUM
CLAMP SCREW
B. LEFT VIEW
TM5815-263-35-97

Figure 341. Clutch trip mechanism.

clearance at the lower magnet core face with a flat feeler gage.

(2) Hold the armature in its energized position and check the clearance with a round wire gage.

(3) Disengage the clutch and check the clearance with a flat feeler gage or a round wire gage.

c. Adjustments.

(1) Remove the clutch trip magnet assembly from the unit (par. 180*b*). Turn the unit over and loosen the mounting hinge clamp screws and position the mounting hinge until requirement *a*(1) above is met. Tighten the clamp screws and recheck the requirement. Replace the magnet assembly (par. 178*c*).

(2) Loosen the backstop eccentric clamp nut (B). With the high part of the eccentric towards the top of the assembly, position the backstop eccentric until requirement *a*(2) above is met. Tighten the clamp nut and recheck the requirement.

(3) Slightly loosen the magnet bracket mounting screws and position the magnet bracket in its lowest position. With the clutch disengaged, position the bracket by means of the screwdriver lug on the bracket (visible through the adjusting slot) to meet requirement *a*(3) above. Tighten the mounting screws and recheck the adjustment.

(4) Replace the cover plate by reversing the procedure used for removal (par. 178*a*).

Note. If excessive chatter is present, adjustment (1) above will have to be refined and adjustments (2) and (3) above rechecked.

545. Armature Bail Spring Tension
(fig. 342)

a. Requirement. With the clutch trip magnet armature (A) in the deenergized position and the main bail latch (B) held away from the armature bail extension, it should require 1 to 2 ounces to start the armature moving.

b. Method of Checking. Remove the cover plate (par. 178*a*). Hook an 8-ounce scale over the top of the armature and pull horizontally to the left. Replace the cover plate by reversing the procedure used for removal (par. 178*a*).

c. Adjustment. Replace the armature bail spring (A) if it fails to meet the requirement.

546. Main Bail Trip Lever Spring Tension
(B, fig. 342)

a. Requirement. With the main bail trip lever released, it should require ¾ to 2 ounces to start the trip lever moving.

b. Method of Checking. Invert the unit, release the main bail trip lever, and apply the push end of an 8-ounce scale to the end that comes in contact with the armature bail extension.

c. Adjustment. Replace the main bail trip lever spring if it fails to meet the requirement.

547. Tape Lid Adjustments
(fig. 343)

a. Requirements.

(1) When the tape lid (A) is held against the notch in the tape guide plate, the feed wheel groove in the tape lid should align with the slot in the tape guide plate; the hole in the tape lid for the tape out sensing pin should align with the hole in the tape guide plate (as gaged by eye); and there should be .001- to .010-inch clearance between the pivot shoulder and the tape lid.

(2) The tape lid front bearing surface should touch the tape guide plate (B), and there should be .010- to .018-inch clearance between the tape lid and the tape guide plate measured at the tape lid fin that is in line with the rear tape guide.

(3) When the tape lid is held down manually, the tape lid latch bail should clear the latch bail post when the tape lid release plunger is operated. The tape lid release plunger should have some end play.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*) and the tape guide plate (par. 179*a*).

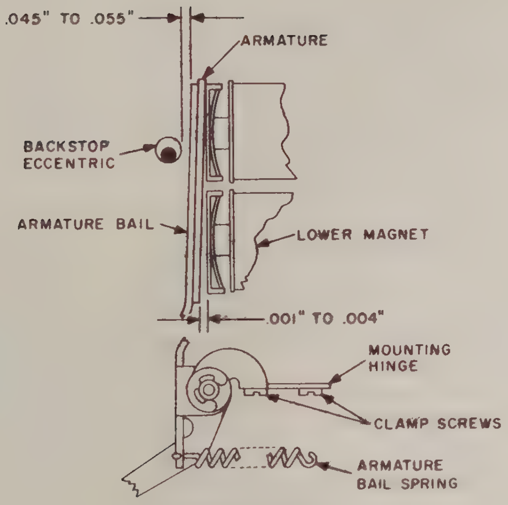
(1) Line up the feed wheel groove in the tape lid with the slot in the tape guide using the 156743 gage. Check the clearance in requirement *a*(1) above between the pivot shoulder and the tape lid with a flat feeler gage. Visually check the feed wheel slots and tape out hole alignments.

(2) Check the clearance in requirement *a*(2) above with a round wire gage.

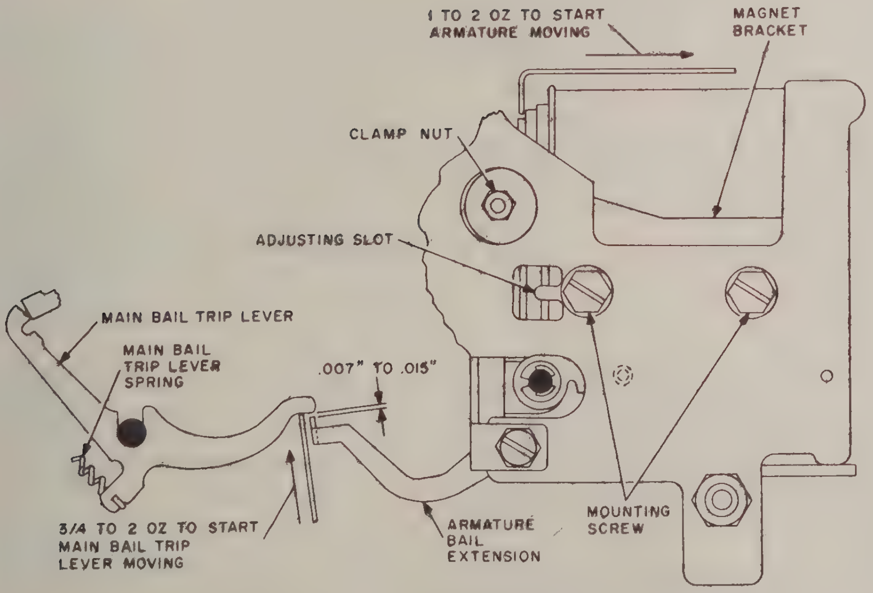
(3) Check requirement *a*(3) above by depressing the tape lid release plunger with the tape lid held down manually. The tape lid latch bail should clear the latch bail post as the plunger is operated. Move the plunger up and down to check for end play.

c. Adjustment.

(1) Loosen the two mounting nuts (A) securing the tape lid bracket to the tape guide plate. Line up the feed wheel groove in the tape lid with the slot in the tape guide plate using the 156743 gage, while keeping the engaged portion of the tape lid pressed against the notch in the tape guide


.045" TO .055"
ARMATURE
BACKSTOP ECCENTRIC
ARMATURE BAIL
LOWER MAGNET
.001" TO .004"
MOUNTING HINGE
CLAMP SCREWS
ARMATURE BAIL SPRING

A. REAR VIEW


1 TO 2 OZ TO START ARMATURE MOVING
MAGNET BRACKET
CLAMP NUT
ADJUSTING SLOT
MAIN BAIL TRIP LEVER
MAIN BAIL TRIP LEVER SPRING
.007" TO .015"
3/4 TO 2 OZ TO START MAIN BAIL TRIP LEVER MOVING
ARMATURE BAIL EXTENSION
MOUNTING SCREW

B. REAR VIEW

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Figure 842. Clutch trip magnet mechanism.

plate. Position the tape lid bracket until requirement *a*(1) above is met. Look down through the hole in the tape lid to check its alignment with the hole in the tape guide plate.

(2) Loosen the two mounting screws that secure the tape lid bearing bracket to the tape guide plate. Press the tape lid firmly against the tape guide plate and position the tape lid bearing bracket until requirement *a*(2) above is met. Check the related adjustment given in *a*(1) above. Tighten the two mounting screws and recheck.

Note. When the top plate and the tape guide plate are assembled on the transmitter distributor, the left edge of the lid may touch the top plate and some change in this clearance may be expected.

(3) Loosen the nut on the latch bail eccentric (A) until the eccentric is friction tight. Raise the tape lid by pressing the tape lid release plunger. Rotate the high part of the eccentric toward the tape guide plate. Close the tape lid and rotate the eccentric toward the tape lid bearing bracket until the tape lid latch bail (B) just falls under the flat on the latch bail post. Tighten the nut. Recheck as instructed in *b*(3) above.

(4) Replace the tape guide plate (par. 179*d*), the top plate, and the cover plate (par. 178*d*).

548. Tape Guide Adjustment
(fig. 343)

a. Requirement.

(1) There should be .001- to .003-inch clearance between the 156743 gage and the left and right tape guides (C), when the gage is properly positioned.

(2) The edge of the wear plate (A) should be flush with the edge of the tape guide plate.

b. Method of Checking. With the tape lid unlatched, place the 156743 gage (C) between the two guides with the center stud of the gage in the feed wheel slot of the tape guide plate and wear plate (A). Push horizontally on the gage (C) until the two remaining studs of the gage butt against the edge of the tape guide plate. Check each clearance with a flat feeler gage.

c. Adjustment. Remove the cover plate and top plate (par. 178*a*) and the tape guide plate (par. 179*a*). Slightly loosen two nuts (A) securing the two tape guides and the wear plate. Position the wear plate until it overhangs the edge of the tape guide plate. Position the 156743 gage as instructed in *b* above. This will place the edge of the wear plate flush with the edge of the tape guide plate. Tighten either one of the mounting nuts on the tape guides. With the gage still in position, place the tape guide which is friction tight so that there is .003-inch clearance between the tape guide and the gage along their common edges. Hold the guide firmly and tighten the nut. Loosen the nut which was initially tightened and repeat the above adjustment. The gage may touch the guides but must not bind when removed. Replace the tape guide plate (par. 179*d*) and the top plate and cover plate (par. 178*d*).

549. Start-Stop Detent Bail Spring Tension
(A, fig. 344)

a. Requirement. It should require 14 to 22 ounces to start the start-stop detent bail moving away from the manual control lever.

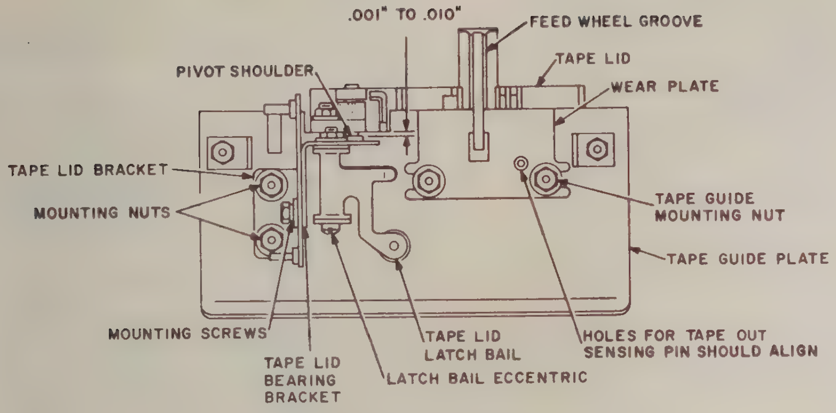
b. Method of Checking. Remove the cover plate and top plate (par. 178*a*). Position the manual control lever in the RUN position. Apply the push end of a 32-ounce scale adjacent to the detent stud and perpendicular to the detent bail arm, and push until the bail begins to move. Replace the top plate and cover plate by reversing the procedures used for removal (par. 178*a*).

c. Adjustment. Replace the start-stop detent bail spring if it fails to meet the requirement.

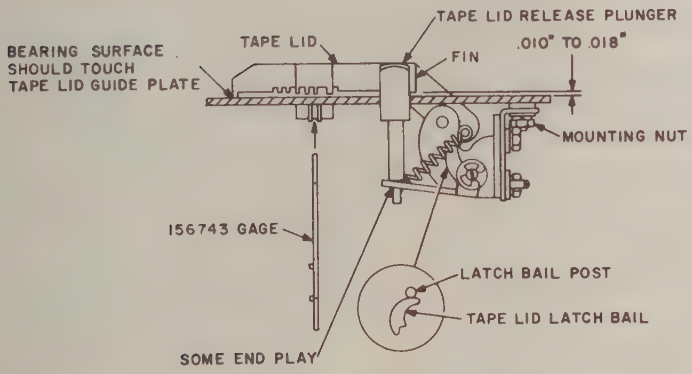
550. Tape Lid Release Plunger Spring Tension
(B, fig. 344)

a. Requirement. With the tape lid unlatched, it should require 3 to 12 ounces to start the tape lid latch bail moving.

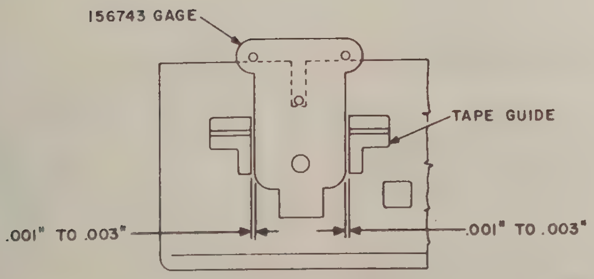
b. Method of Checking. With the tape lid unlatched and the tape guide plate held in a horizontal position (if removed), apply the push end of an 8-ounce scale to the top of the tape lid release plunger and push downward.


.001" TO .010"
FEED WHEEL GROOVE
TAPE LID
PIVOT SHOULDER
WEAR PLATE
TAPE LID BRACKET
MOUNTING NUTS
TAPE GUIDE MOUNTING NUT
TAPE GUIDE PLATE
MOUNTING SCREWS
TAPE LID LATCH BAIL
HOLES FOR TAPE OUT SENSING PIN SHOULD ALIGN
TAPE LID BEARING BRACKET
LATCH BAIL ECCENTRIC

A. BOTTOM VIEW


TAPE LID RELEASE PLUNGER
BEARING SURFACE SHOULD TOUCH TAPE LID GUIDE PLATE
TAPE LID
FIN
.010" TO .018"
MOUNTING NUT
156743 GAGE
LATCH BAIL POST
TAPE LID LATCH BAIL
SOME END PLAY

B. RIGHT SIDE VIEW


156743 GAGE
TAPE GUIDE
.001" TO .003"
.001" TO .003"

C. TOP VIEW

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Figure 343. Tape guide plate mechanism.

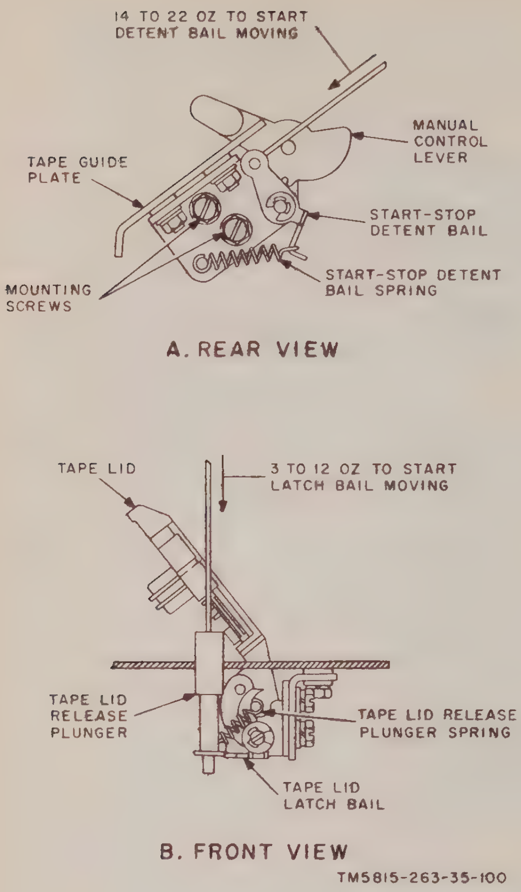

14 TO 22 OZ TO START DETENT BAIL MOVING
MANUAL CONTROL LEVER
TAPE GUIDE PLATE
START-STOP DETENT BAIL
START-STOP DETENT BAIL SPRING
MOUNTING SCREWS
A. REAR VIEW
TAPE LID
3 TO 12 OZ TO START LATCH BAIL MOVING
TAPE LID RELEASE PLUNGER
TAPE LID RELEASE PLUNGER SPRING
TAPE LID LATCH BAIL
B. FRONT VIEW
TM5815-263-35-100

Figure 344. Tape lid mechanism.

c. Adjustment. Replace the tape lid release plunger spring if it fails to meet the requirement.

551. Tape Guide Plate Mounting Adjustment

a. Requirements.

(1) The feed wheel post shoulder should not interfere with the top plate or the tape guide plate mounting brackets (fig. 345).

(2) The tape guide plate should rest firmly against at least three projections of the front and rear plates.

(3) The outer edges of the mounting brackets and the outer edges of the mounting stud shoulders should be approximately in line. The mounting brackets should project equally on the shoulders of the mounting studs (fig. 182).

b. Method of Checking. Check the above requirements visually.

c. Adjustments. Remove the cover plate and top plate (par. 178*a*).

Note. Loosen the clamp screw (A, fig. 349) that secures the sensing pin stop arm to the depressor bail bracket. Position the sensing pin stop arm (B) in its lowermost position to prevent distortion to the tape-out sensing pin and also keep the start-stop bail extension from touching the feed wheel ratchet. Tighten the clamp screw.

(1) Loosen the clamp nut on the feed wheel post (fig. 345). Rotate the post to obtain requirement *a*(1) above. Tighten the clamp nut.

(2) Loosen the mounting nuts on the front and rear mounting brackets, and the bracket mounting screws on the front and rear plate. Trip the clutch and rotate the main shaft until the sensing fingers are in their uppermost position. Raise the tape lid and place the manual control lever in the RUN position. Press the tape guide plate into position while guiding the mounting screws into the notch of the front and rear plates. Tighten the mounting screws. Position the tip of the tape-out sensing pin with the hole in the tape guide plate.

(3) Move the tape guide to the front or rear to meet requirement *a*(3) above. Gage by eye. Tighten the mounting

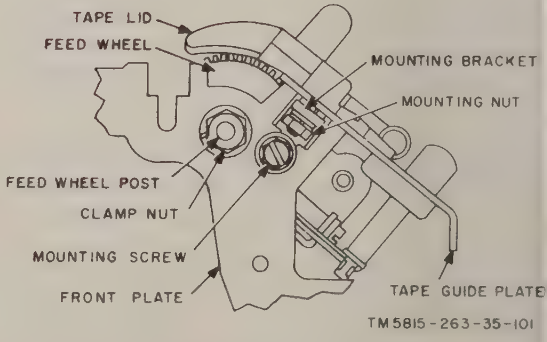

TAPE LID
FEED WHEEL
MOUNTING BRACKET
MOUNTING NUT
FEED WHEEL POST
CLAMP NUT
MOUNTING SCREW
FRONT PLATE
TAPE GUIDE PLATE
TM5815-263-35-101

Figure 345. Tape guide plate mechanism, front view.

nuts only after the top plate is adjusted (par. 552). Replace the cover plate and top plate by reversing the procedure used in removal (par. 178*a*).

552. Top Plate Adjustment

a. Requirements.

(1) The mating edge of the top plate (A, fig. 346) should be flush to .003 inch under flush with the edge of the tape guide plate within the area of the tape lid, when the top plate touches at least five of six projections on the front and rear plates with the cover plate removed.

(2) The feed wheel slot in the top plate should line up with the slot in the tape guide plate so that the feed wheel rotates freely when the manual control lever is placed in the FREE position.

(3) With the tape lid latched, the clearance between the tape lid extension, which covers the feed wheel slot, and the top plate should be .010- to .020-inch and there should be .010- to .018-inch clearance between the tape lid and the tape guide plate when measured between the tape guides when the play in the tape lid is taken toward the tape guide plate.

b. Method of Checking.

(1) Visually check that the top plate seats firmly against at least five of the six projections of the front and rear plate. Check the clearance in requirement *a*(1) above with a round wire gage.

(2) Place the manual control lever in the FREE position and manually spin the feed wheel. The feed wheel should rotate freely without binding.

(3) Check the clearance in requirement *a*(3) above with a round wire gage.

c. Adjustment. Remove the cover plate (par. 178*a*).

(1) Loosen the mounting nuts on the front and rear brackets and the bracket mounting screws which secure the top plate to the front and rear plate. Place the top plate into position making certain that the plate is touching at least five of the six projections on the front and rear plates. Tighten the mounting screws holding the mounting brackets to the front and rear plates. Position the top plate and the tape guide plate such that the edge of the top plate is flush or below flush not exceeding .003 inch with respect to the tape guide plate. Tighten the two nuts which hold the mounting brackets to the tape guide plate and recheck requirement *b*(1) above.

(2) Position the top plate to the rear or front to line up the feed wheel slot. The feed wheel should rotate freely with the manual control lever in the FREE position. Tighten the two mounting nuts and recheck *b*(2) above. Do not disturb the tape guide plate mounting adjustments (par. 551).

(3) If necessary, loosen the two mounting screws which fasten the tape lid mounting and tape lid bearing brackets together (fig. 344) and position the tape lid until requirement *a*(3) above has been met. Tighten the mounting screws and recheck *b*(3) above. Recheck the tape lid requirements (par. 547*a*(1) and (2)) by removing the top and tape guide plates.

553. Cover Plate Adjustment

(B, fig. 346)

a. Requirement.

(1) The right edge of the cover plate should be held flush against the left edge of the top plate by the cover plate detent nuts.

(2) The cover plate should rest against at least three of the four projections of the front and rear plates.

(3) The front edge of the cover and the top plates should be in line.

b. Method of Checking. Check the three requirements visually.

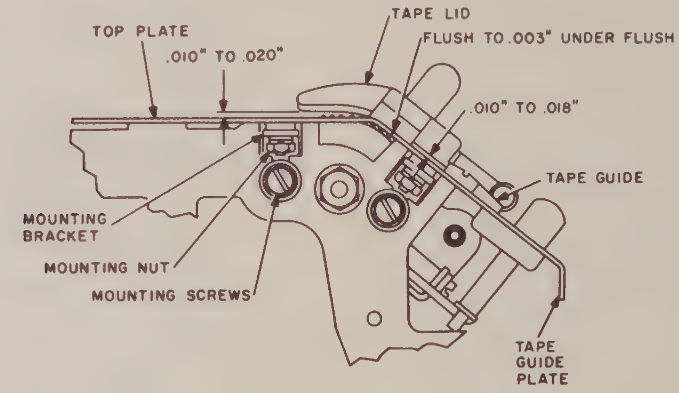
c. Adjustment. Remove the cover plate (par. 178*a*) and loosen the detent nut clamp screw of the front and rear plate to loosen the detent nuts and move the nuts to the extreme right position. Tighten the screws. Loosen the mounting nuts on the detent plunger bracket and spring plate. Place the cover plate into position, and move the plate horizontally to meet requirements *a*(1) and (3) above. Tighten the detent plunger bracket mounting nuts. Remove the cover plate and tighten the spring plate mounting nuts after placing the edge of the spring plate the same distance from the edge of the cover plate as the detent plunger bracket. If detenting of the plungers does not seat the cover plate as required in *a* above, relocate the detent nut clamp screws. Replace the cover plate by reversing the procedure used in removal (par. 178*a*).

554. Cover Plate Detent Plunger Spring Tension (fig. 347)

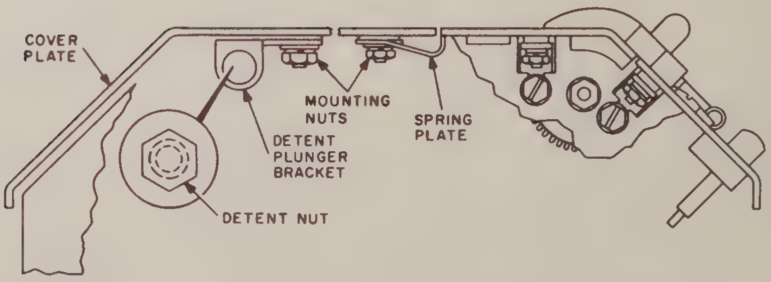
a. Requirement. It should require 28 to 48 ounces to start the detent plunger moving.

b. Method of Checking. Remove the cover plate (par. 178*a*) and apply the push end of a 64-ounce scale to the center of one detent plunger and push in line with the spring centerline. Replace the cover plate by reversing the procedure used for removal.

c. Adjustment. Replace the detent plunger spring if it fails to meet the requirement.


TAPE LID
TOP PLATE
FLUSH TO .003" UNDER FLUSH
.010" TO .020"
.010" TO .018"
TAPE GUIDE
MOUNTING BRACKET
MOUNTING NUT
MOUNTING SCREWS
TAPE GUIDE PLATE

A. FRONT VIEW


COVER PLATE
MOUNTING NUTS
SPRING PLATE
DETENT PLUNGER BRACKET
DETENT NUT

B. FRONT VIEW

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Figure 346. Top plate and cover plate.

555. Tape Out Switch S14 Adjustment

a. Requirements.

(1) If should require 8 to 15 grams applied at the center of the insulator on the contact swinger to just separate the normally closed contacts (5–13) of tape out switch S14 (fig. 348).

(2) There should be .008- to .015-inch gap between the normally open contacts.

b. Method of Checking. Set the manual control lever in the STOP position. Loosen the switch bracket mounting screws and move the spring bracket downward until the extension on the tape-out sensing pin clears the insulator on the contact swinger. Check the spring tension given in *a*(1) above with a 60-gram scale, and the clearance in *a*(2) above requirement with a flat feeler gage or a round wire gage.

c. Adjustment. Remove the cover plate and the top plate (par. 178*a*). (The tape guide plate (par. 178*d*) may be removed if desired.) Remove the intermediate tape out bail spring (B, fig. 349). Remove the tape out switch S15 (fig. 348) from the front plate by removing the two mounting screws securing the switch bracket. Perform either one or both of the following adjustments:

(1) Bend the contact swinger using a suitable spring bender until the required spring tension has been obtained (*a*(1) above).

(2) Bend the contact swinger using a suitable spring bender until the required clearance has been met (*a*(2) above).

(3) After completing the adjustment replace switch S15 with the contact swinger over the tape out sensing pin extension. Replace the spring bracket, the shoulder bushing on the upper hole, the washer on the lower hole, and tighten the screws into the screw plate. Replace the intermediate tape out bail spring. Replace the tape guide plate (par. 179*d*) if it was removed and the top plate and cover plate (par. 178*d*).

556. Tape Out Switch S15 Bracket Adjustment (fig. 348)

a. Requirement. There should be .006- to .012-inch clearance between the tape out sensing pin extension and the underside of the insulator on the contact swinger when the tape

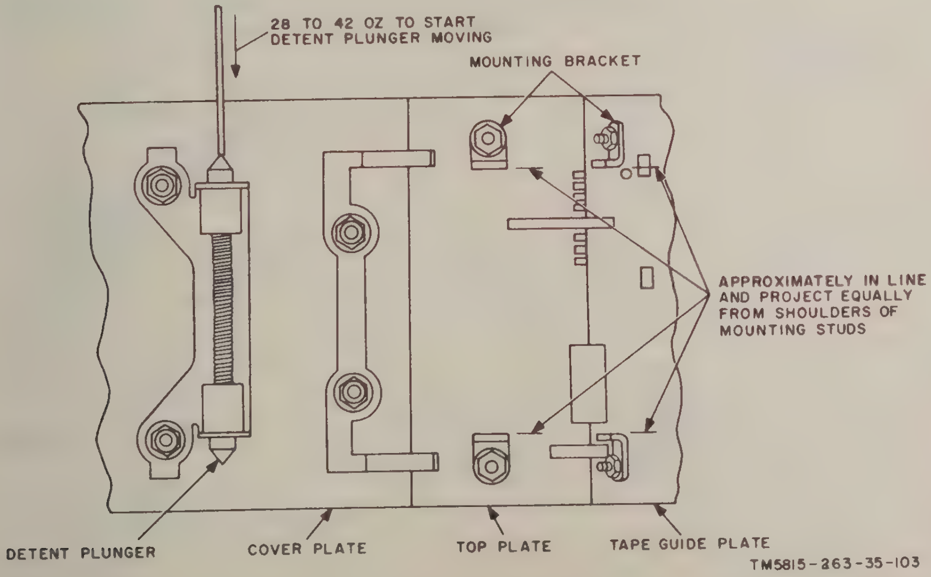

28 TO 42 OZ TO START DETENT PLUNGER MOVING
MOUNTING BRACKET
APPROXIMATELY IN LINE AND PROJECT EQUALLY FROM SHOULDERS OF MOUNTING STUDS
DETENT PLUNGER
COVER PLATE
TOP PLATE
TAPE GUIDE PLATE
TM5815-263-35-103

Figure 347. Cover plate, top plate, and tape guide plate, bottom view.

out sensing pin is held down with a piece of tape inserted under the tape lid.

b. Method of Checking. Check the required clearance with a flat feeler gage or a round wire gage.

c. Adjustment. Loosen the two mounting screws that secure the switch bracket to the front plate. Position the bracket to obtain the requirement. Tighten the mounting screws and recheck the clearance.

557. Tape Out Sensing Pin Spring Tension
(fig. 348)

a. Requirement. It should require a pressure of 38 to 45 grams to move the tape out sensing pin to a position flush with the tape guide plate.

b. Method of Checking. With the manual control lever in the RUN position, apply the end of a 60-gram scale to the end of the tape out sensing pin and push downward in line with the pin.

c. Adjustment. Loosen the switch bracke mounting screws and position the sprin bracket until the requirement is met. Tighte the mounting screws.

558. Tape Out Sensing Pin Adjustment
(fig. 349)

a. Requirement.

(1) With the manual control lever in th FREE or the STOP position, the tap out sensing pin (B) should be flush t .010 inch below the surface of the tap guide plate.

(2) With the manual control lever in the RUN position, there should be a minimum of .055 inch clearance betwee the lower extension on the tape out pin and the extension of the tape out pin depressor bail.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*). Check the

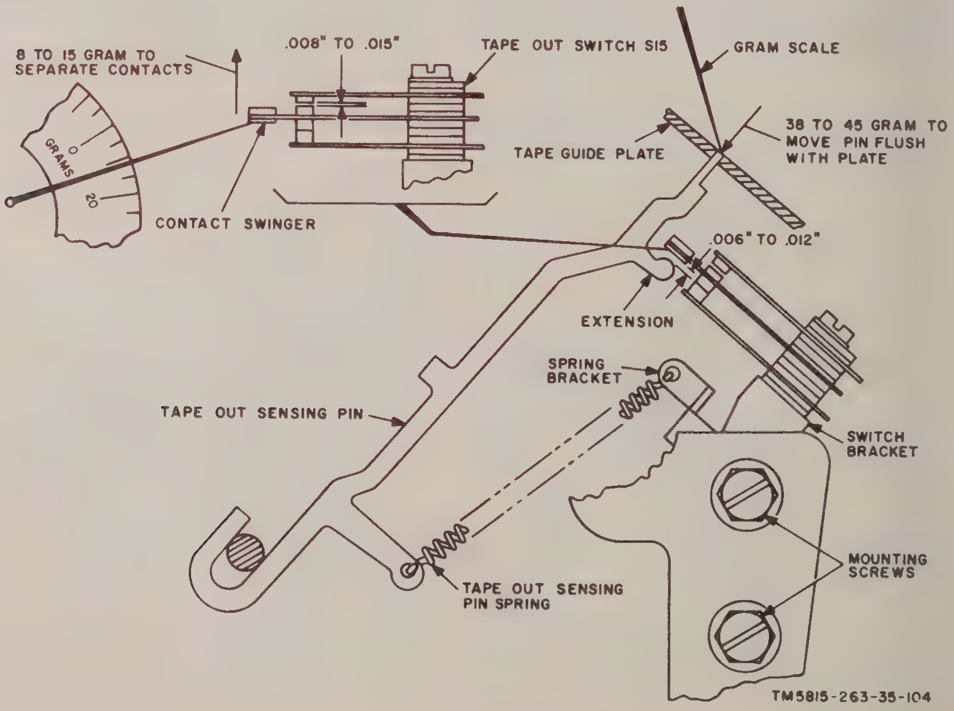

8 TO 15 GRAM TO SEPARATE CONTACTS
.008" TO .015"
TAPE OUT SWITCH S15
GRAM SCALE
GRAMS
0
20
TAPE GUIDE PLATE
38 TO 45 GRAM TO MOVE PIN FLUSH WITH PLATE
CONTACT SWINGER
.006" TO .012"
EXTENSION
SPRING BRACKET
TAPE OUT SENSING PIN
SWITCH BRACKET
MOUNTING SCREWS
TAPE OUT SENSING PIN SPRING
TM5815-263-35-104

Figure 348. Tape out sensing pin and tape out switch S15, front view.

required clearances with a flat feeler gage or a round wire gage.

c. Adjustments.

(1) Place the manual control lever in the STOP or the FREE position. Loosen the clamp screw which secures the sensing pin stop arm to the depressor bail bracket and adjust the stop arm until requirement *a*(1) above has been met. Tighten the clamp screw and recheck.

(2) Place the manual control lever in the RUN position. Loosen the clamp screw (A) that secures the intermediate bail extension arm to the intermediate tape out bail. With a tommy wrench or a similar tool change the relative position of the extension arm to the bail until the required clearance has been obtained. Tighten the screw and recheck requirements *a*(1), and (2) above. Replace the top plate and cover plate by reversing the procedure used for removal (par. 178*a*).

559. Depressor Bail Torsion Spring

(fig. 349)

a. Requirement. It should require 3 to 5½ ounces to start the intermediate tape out bail (B) moving away from the tape out pin depressor bail.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*), place the manual control lever in the STOP position, and unhook one end of the intermediate tape out bail spring. Apply the push end of an 8-ounce scale to the extension on the tape out intermediate bail, near the spring hole, and push downward. Rehook the spring and replace the top plate and cover plate by reversing the procedures used for removal (par. 178*d*).

c. Adjustment. Replace the depressor bail torsion spring (A) if it fails to meet the requirement.

560. Intermediate Tape Out Bail Spring Tension

(B, fig. 349)

a. Requirement. With the manual control lever in the RUN position, it should require 3 to 5 ounces to pull the intermediate tape out bail spring to its installed length.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*), place the manual control lever in the RUN position, and hook an 8-ounce scale in the spring loop and pull horizontally to the left to its installed length. Replace the top plate and cover plate by reversing the procedures used for removal (par. 178*a*).

c. Adjustment. Replace the intermediate tape out spring if it fails to meet the requirement.

561. Manual Control and Tight Tape Switch S14 Switch Bracket Adjustment

(fig. 350)

a. Requirement.

(1) With the clutch disengaged and the manual control lever in the RUN position, there should be .006- to .015-inch clearance between the start-stop bail extension (A) and the insulator on the contact swinger of switch S14.

(2) The start-stop bail extension should fully engage the insulated portion of the contact swinger (B).

b. Method of Checking.

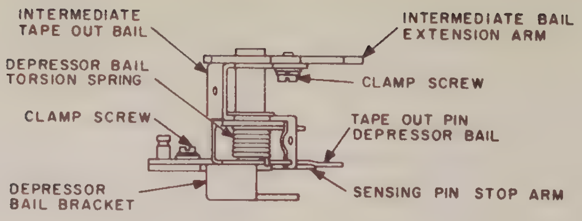
(1) Disengage the clutch and place the manual control lever in the RUN position. Check requirement *a*(1) above with a flat feeler gage or a round wire gage.

(2) Check requirement *a*(2) above visually.

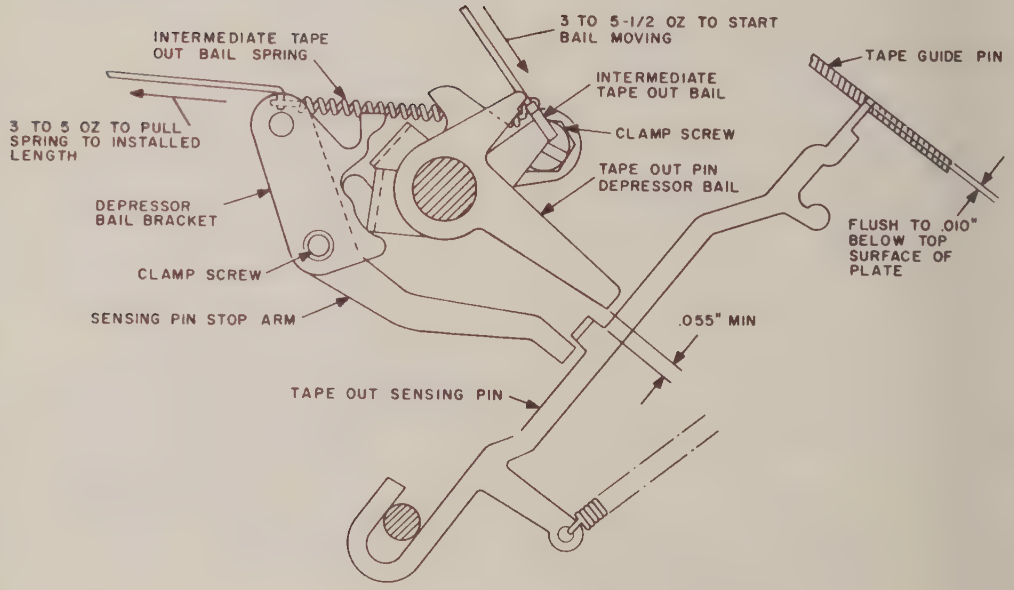
c. Adjustment. Remove the cover plate (par. 178*a*). Disengage the clutch and place the manual control lever in the RUN position.

(1) Loosen the switch bracket mounting screws and position the bracket until requirement *a*(1) above has been met. Tighten the mounting screws.

(2) Loosen the mounting screws on the manual control and tight tape switch S14. Align the contact assembly until requirement *a*(2) above has been met. Tighten the mounting screws. Replace the cover plate by reversing the procedures used for removal (par. 178*a*).


INTERMEDIATE TAPE OUT BAIL
DEPRESSOR BAIL TORSION SPRING
CLAMP SCREW
DEPRESSOR BAIL BRACKET
INTERMEDIATE BAIL EXTENSION ARM
CLAMP SCREW
TAPE OUT PIN DEPRESSOR BAIL
SENSING PIN STOP ARM

A. PARTIAL TOP VIEW


INTERMEDIATE TAPE OUT BAIL SPRING
3 TO 5 OZ TO PULL SPRING TO INSTALLED LENGTH
DEPRESSOR BAIL BRACKET
CLAMP SCREW
SENSING PIN STOP ARM
TAPE OUT SENSING PIN
3 TO 5-1/2 OZ TO START BAIL MOVING
INTERMEDIATE TAPE OUT BAIL
CLAMP SCREW
TAPE OUT PIN DEPRESSOR BAIL
TAPE GUIDE PIN
FLUSH TO .010" BELOW TOP SURFACE OF PLATE
.055" MIN

B. FRONT VIEW

TM5815-263-35-105

Figure 349. Intermediate tape out bail mechanism and tape out sensing pin.

562. Tight Tape Intermediate Arm Adjustment
(A, fig. 350)

a. Requirements. With the manual control lever in the RUN position, the contacts of the manual control and tight tape switch S14 should function as follows:

(1) Contacts remain closed when the tight tape bail is raised up to a height of .045 inch away from the tape guide plate.

(2) Contacts open when the bail is raised to a height of .045 to .075 inch away from the tape guide plate.

b. Method of Checking. Place the manual control lever in the RUN position, and check the requirements as follows:

(1) Place a .040 inch gage between the tight tape bail and the tape guide plate. Check visually that the contacts are closed.

(2) Place a .060 inch gage between the tight tape bail and the tape guide plate. Check visually that the contacts open.

c. Adjustment. Remove the cover (par. 178*a*) and place the manual control lever in the RUN position. Loosen the clamp screw on the tight tape and position the arm in its adjusting slot to meet the requirements. Check as instructed above while adjusting the arm and replace the cover. Tighten the clamp screw and recheck.

563. Manual Control and Tight Tape Switch S14 Contact Spring Tension

(fig. 350)

a. Requirement. With the manual control lever in the RUN position, it should require 3 to 4 ounces to separate the contacts (A) of the manual control and tight tape switch S14(B).

b. Method of Checking. Remove the cover plate (par. 178*a*), set the manual control lever in the RUN position and hook an 8 ounce scale under the contact swinger (A) and pull upward until the contacts just begin to separate. Replace the cover plate by reversing the procedure used for removal (par. 178*a*).

c. Adjustment. Use a suitable spring bender to bend the contact swinger until the requirement is met. Check related adjustment .(pars. 561 and 562).

564. Tight Tape Intermediate Arm Spring Tension

(A, fig. 350)

a. Requirement. With the manual control lever in the RUN position, it should require 20 to 40 grams to start the tight tape intermediate arm moving away from its yield arm.

b. Method of Checking. Remove the cover plate (par. 178*a*), set the manual control lever in the RUN position, and place the end of a 60-gram scale above the spring hole of the yield arm extension and push downward. Replace the cover plate by reversing the procedures used for removal (par. 178*a*).

c. Adjustment. Replace the tight tape intermediate arm spring if it fails to meet the requirement.

565. Main Bail Adjustment

(fig. 351)

a. Requirement. With the code sensing fingers in their lowermost position, the clearance between the highest sensing finger and the top surface of the tape guide plate should be .010- to .020- inch.

b. Method of Checking. Trip the clutch and rotate the main shaft until the code sensing fingers are in the lowermost position. Check the required clearance with a round wire gage.

c. Adjustment. Slightly loosen the mounting nut on the main bail eccentric. Position the high part of the eccentric toward the right and adjust until the requirement is met. Tighten the mounting nut and recheck the adjustment.

566. Main Bail Spring Tension

(fig. 351)

a. Requirement. With the clutch disengaged it should require 6 to 10 ounces to pull the main bail spring to its installed length.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*) and disengage the clutch. Unhook the upper end of the main bail spring. Hook a 32-ounce scale in the spring loop and pull the spring to its installed length. Rehook the spring and replace the top plate and cover plate by reversing the procedures used for removal (par. 178*a*).

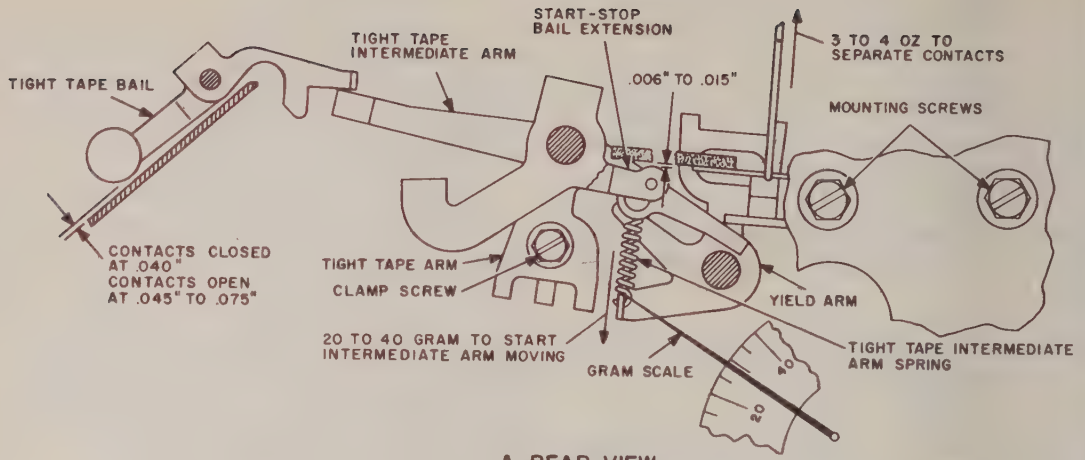
c. Adjustment. Replace the main bail spring if it fails to meet the requirement.

567. Ratchet Detent Bail Spring Tension

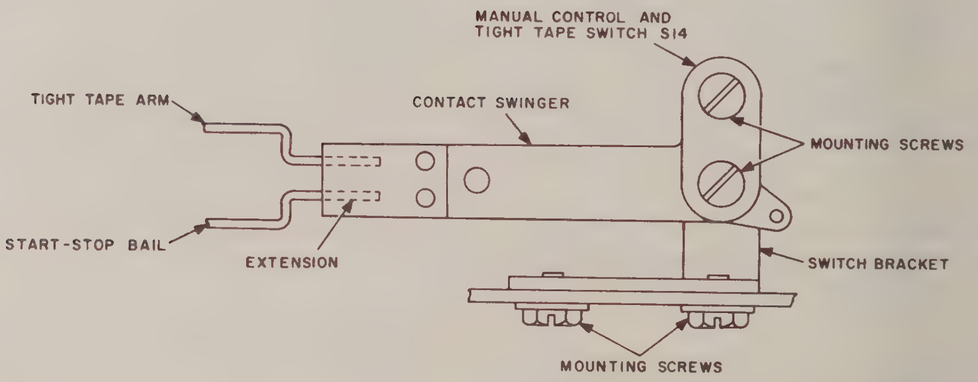
a. Requirement. With the clutch disengaged and the feed pawl (fig. 353) held away from the feed wheel ratchet, it should require 8 to 13 ounces to start the detent roller (fig. 351) moving away from the feed wheel ratchet.

b. Method of Checking. Remove the cover plate (par. 178*a*). Disengage the clutch and hold the feed pawl away from the feed wheel ratchet. Place the push end of a 32-ounce scale on the detent rollor stud and push horizontally to the left. Replace the cover plate by reversing the procedures used for removal (par. 178*a*).

c. Adjustment. Replace the ratchet detent bail spring if it fails to meet the requirement.


START-STOP
BAIL EXTENSION
TIGHT TAPE
INTERMEDIATE ARM
3 TO 4 OZ TO
SEPARATE CONTACTS
.006" TO .015"
TIGHT TAPE BAIL
MOUNTING SCREWS
CONTACTS CLOSED
AT .040"
CONTACTS OPEN
AT .045" TO .075"
TIGHT TAPE ARM
CLAMP SCREW
YIELD ARM
20 TO 40 GRAM TO START
INTERMEDIATE ARM MOVING
TIGHT TAPE INTERMEDIATE
ARM SPRING
GRAM SCALE
40
20

A. REAR VIEW


MANUAL CONTROL AND
TIGHT TAPE SWITCH S14
TIGHT TAPE ARM
CONTACT SWINGER
MOUNTING SCREWS
START-STOP BAIL
EXTENSION
SWITCH BRACKET
MOUNTING SCREWS

B. TOP VIEW

TM5815-263-35-106

Figure 350. Tight tape bail and manual control and tight tape switch S14.

568. Feed Wheel Detent Adjustment

a. Requirement. With the tape lid raised, the manual control lever in the FREE position, clutch disengaged and main shaft rotated until the sensing fingers are in the down position, and the high part of the ratchet detent eccentric (fig. 351) to the right; place a "letters" perforated tape between the tape guides (B, fig. 352). With the play in the tape taken toward the right, the tip of each sensing finger should be centrally located in the holes of the perforated tape.

b. Method of Checking. Check the above requirement visually.

c. Adjustment. Loosen the mounting nut that secures the ratchet detent eccentric (fig. 351) to the center plate. Unlatch the tape lid, place the manual control lever in the FREE position, disengage the clutch and rotate the main shaft until the sensing fingers are in the down position, and place a piece of "letters" tape between the tape guides (B, fig. 352). Position the ratchet detent eccentric (fig. 548) with the play in the tape feed holes taken up

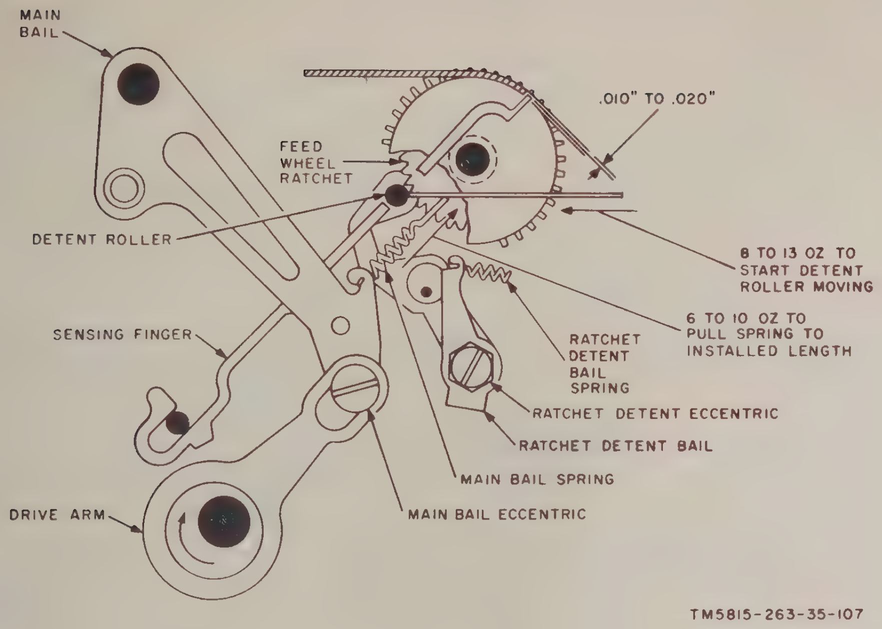

MAIN BAIL
FEED WHEEL RATCHET
.010" TO .020"
DETENT ROLLER
8 TO 13 OZ TO START DETENT ROLLER MOVING
6 TO 10 OZ TO PULL SPRING TO INSTALLED LENGTH
SENSING FINGER
RATCHET DETENT BAIL SPRING
RATCHET DETENT ECCENTRIC
RATCHET DETENT BAIL
MAIN BAIL SPRING
DRIVE ARM
MAIN BAIL ECCENTRIC
TM5815-263-35-107

Figure 351. Feed wheel detent mechanism, front view.

towards the right and the feed pawl (fig. 353) held away from the feed wheel ratchet so that the sensing fingers are centered in the code holes. Tighten the ratchet detent eccentric mounting nut and recheck the adjustment. Check the feed pawl adjustment (par. 570).

569. Sensing Finger Spring Tension
(A, fig. 352)

a. Requirement. It should require 3 to 5 ounces to move each sensing finger to a flush position with the top surface of the top plate or tape guide plate.

b. Method of Checking. With the unit in the upright position, raise the tape lid, trip the clutch from its stop position and rotate the main shaft until the sensing fingers are in their uppermost position. Apply the push end of an 8-ounce scale to the end of each sensing finger and push down in line with the finger. Measure the tension of five sensing finger springs.

c. Adjustment. Replace any sensing finger spring that fails to meet the requirement. Remove the cover and top plate (par. 178*a*) to replace the spring, and after spring replacement replace the top plate and cover by reversing the procedure used for removal (par. 178*a*).

570. Feed Pawl Adjustment
(A, fig. 353)

a. Requirement. There should be .001- to .003-inch clearance between the feed pawl and the feed wheel ratchet tooth just engaged when the high part of the feed pawl eccentric is toward the right and the sensing fingers are in their lowermost position.

b. Method of Checking. Remove the cover plate and top plate (par. 178*a*), trip the clutch and rotate the main shaft until the sensing fingers are in their lowermost position. Check that the high part of the feed pawl eccentric is toward the right. Check the required clearance with a flat feeler gage.

c. Adjustment. Loosen the feed pawl eccentric lock nut and position the eccentric until the requirement has been met. Tighten the locknut and recheck the clearance at four posi-

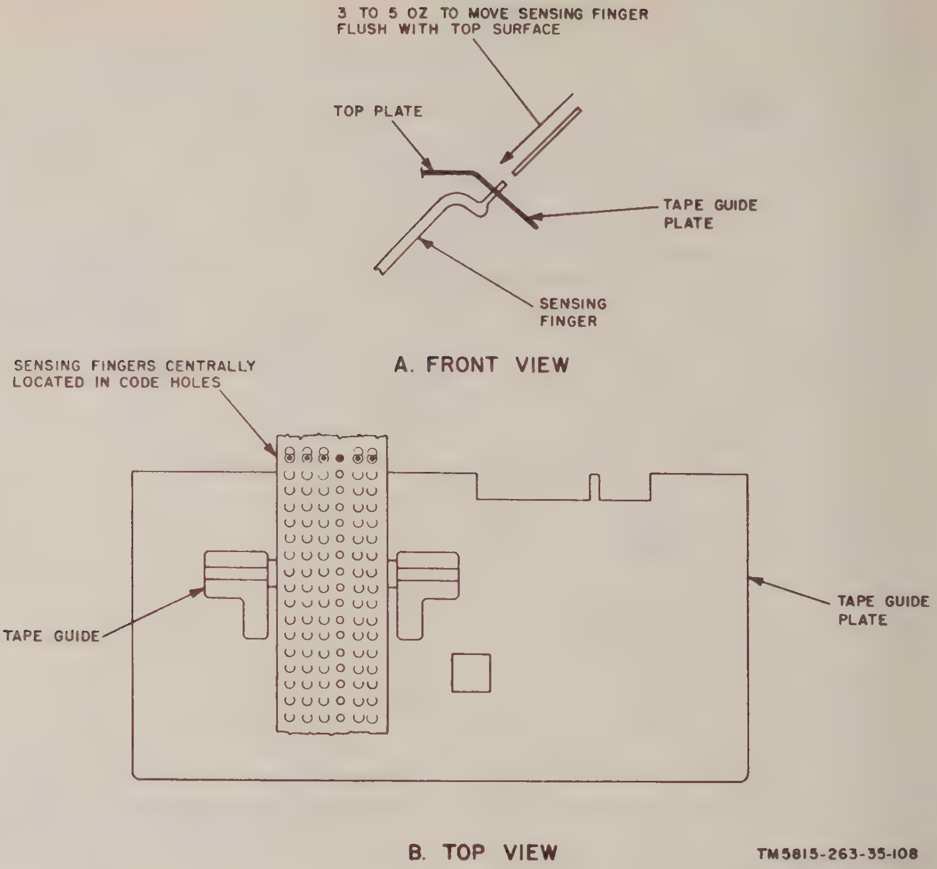

3 TO 5 OZ TO MOVE SENSING FINGER FLUSH WITH TOP SURFACE
TOP PLATE
TAPE GUIDE PLATE
SENSING FINGER
A. FRONT VIEW
SENSING FINGERS CENTRALLY LOCATED IN CODE HOLES
TAPE GUIDE
TAPE GUIDE PLATE
B. TOP VIEW
TM5815-263-35-108

Figure 352. Tape guide plate and code sensing finger.

tions of the feed wheel ratchet, approximately 90° apart. Refine if necessary. Check the feed wheel detent adjustment (par. 569). Replace the top plate and cover plate by reversing the procedures used for removal (par. 178*a*).

571. Feed Pawl Spring Tension
(A, fig. 353)

a. Requirement. With the clutch disengaged it should require 2 to 3½ ounces to start the feed pawl moving.

b. Method of Checking. With the unit tilted to the left, hook an 8-ounce scale over the extension of the feed pawl and pull in line with the spring.

c. Adjustment. Replace the feed pawl spring if it fails to meet the requirement.

572. Transfer Lever Spring Tension
(B, fig. 353)

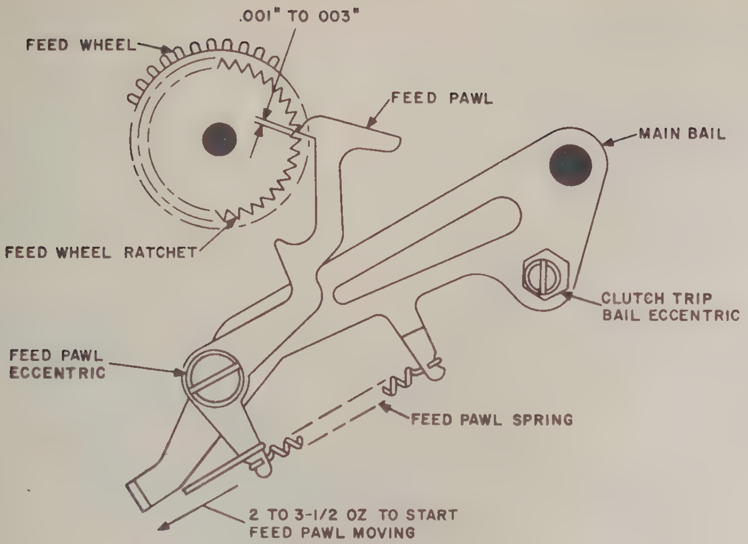
a. Requirement. With the clutch disengaged it should require ½ to 1½ ounces to start each transfer lever moving.

b. Method of Checking. Invert the unit and apply the push end of an 8-ounce scale to each transfer lever near the transfer lever guide and perpendicular to the transfer lever. Measure the tension of seven transfer lever springs.

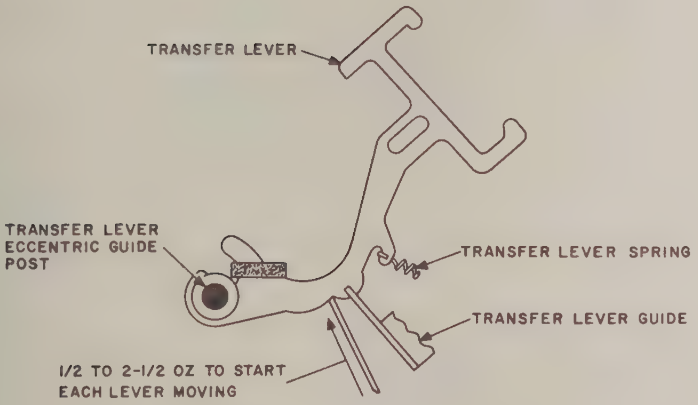
c. Adjustment. Replace any transfer lever spring that fails to meet the requirement.

573. Main Bail Trip Lever Adjustment
(A, fig. 354)

a. Requirement. With the clutch disengaged, the tip of the highest sensing finger should be


.001" TO 003"
FEED WHEEL
FEED PAWL
MAIN BAIL
FEED WHEEL RATCHET
CLUTCH TRIP BAIL ECCENTRIC
FEED PAWL ECCENTRIC
FEED PAWL SPRING
2 TO 3-1/2 OZ TO START FEED PAWL MOVING

A. REAR VIEW


TRANSFER LEVER
TRANSFER LEVER ECCENTRIC GUIDE POST
TRANSFER LEVER SPRING
TRANSFER LEVER GUIDE
1/2 TO 2-1/2 OZ TO START EACH LEVER MOVING

B. REAR VIEW

TM5815-263-35-109

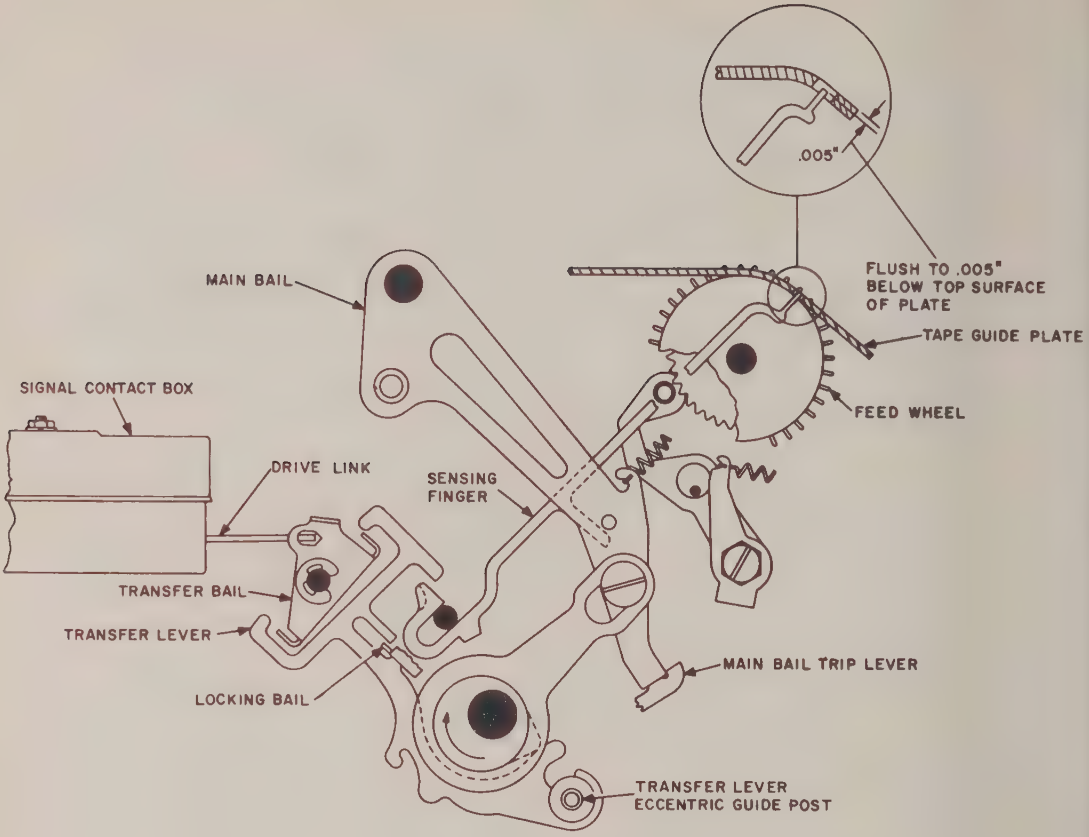
Figure 353. Feed pawl mechanism.

ush to .005 inch below the top surface of the ape guide plate.

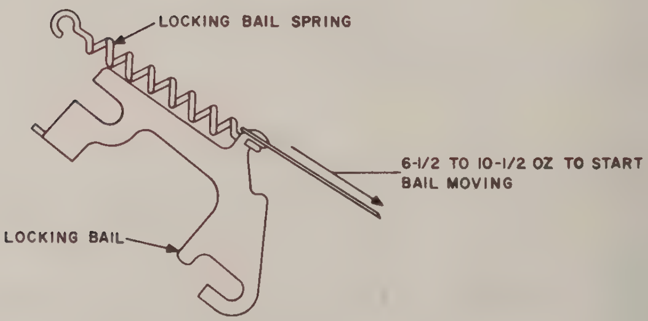
b. Adjustment. Loosen the locknuts that asten the transfer lever eccentric guide post the front plate and center plate. Position the centric guide until the post requirement is net. Tighten the locknuts and check for proper operation. Recheck and readjust if necessary. Check the clutch trip magnet adjustment (par. 544).

574. Locking Bail Spring Tension
(fig. 354)

a. Requirement. With the clutch disen-


.005"
FLUSH TO .005" BELOW TOP SURFACE OF PLATE
MAIN BAIL
TAPE GUIDE PLATE
SIGNAL CONTACT BOX
FEED WHEEL
DRIVE LINK
SENSING FINGER
TRANSFER BAIL
TRANSFER LEVER
MAIN BAIL TRIP LEVER
LOCKING BAIL
TRANSFER LEVER ECCENTRIC GUIDE POST

A. FRONT VIEW


LOCKING BAIL SPRING
6-1/2 TO 10-1/2 OZ TO START BAIL MOVING
LOCKING BAIL

B. FRONT VIEW

TM5815-263-35-110

Figure 354. Main bail trip lever mechanism.

gaged, it should require 6½ to 10½ ounces to tart the locking bail (A) moving.

b. *Method of Checking.* Tilt the unit toward he left. Hook an 8-ounce scale over the locking ail extension (B) and pull in line with the pring.

c. *Adjustment.* Replace the locking bail pring if it fails to meet the requirement.

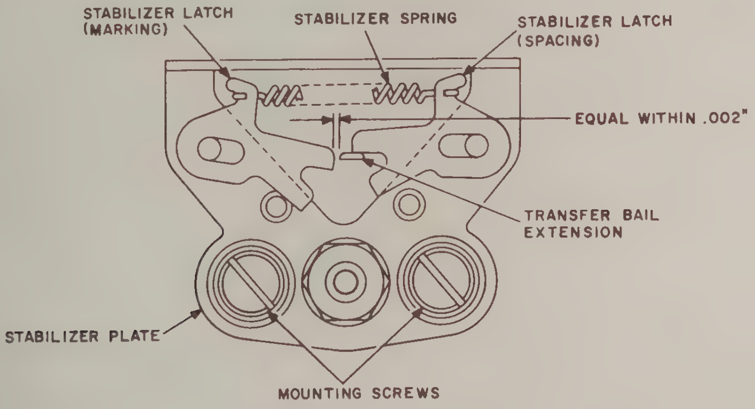
575. Transfer Bail Stabilizer Adjustment (fig. 355)

a. *Requirements.* When the clutch is engaged and the main shaft rotated until the umber 3 transfer lever is on the high part of its cam, the following requirements should be met:

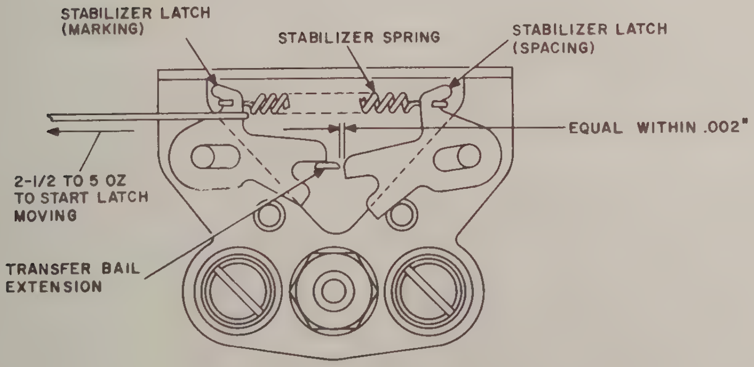
(1) There should be some clearance between the side of the transfer bail extension and the stabilizer latch (marking) (B) when a "letters" combination is selected.

(2) There should be some clearance between the side of the transfer bail extension and the stabilizer latch (spacing) (A) when a "blank" combination is selected.

(3) The clearance between the stabilizer latches when in a marking (B) or


STABILIZER LATCH (MARKING)
STABILIZER SPRING
STABILIZER LATCH (SPACING)
EQUAL WITHIN .002"
TRANSFER BAIL EXTENSION
STABILIZER PLATE
MOUNTING SCREWS

A. SPACING POSITION


STABILIZER LATCH (MARKING)
STABILIZER SPRING
STABILIZER LATCH (SPACING)
EQUAL WITHIN .002"
2-1/2 TO 5 OZ TO START LATCH MOVING
TRANSFER BAIL EXTENSION

B. MARKING POSITION

TM5815-263-35-111

Figure 355. Transfer bail stabilizer assembly, front view.

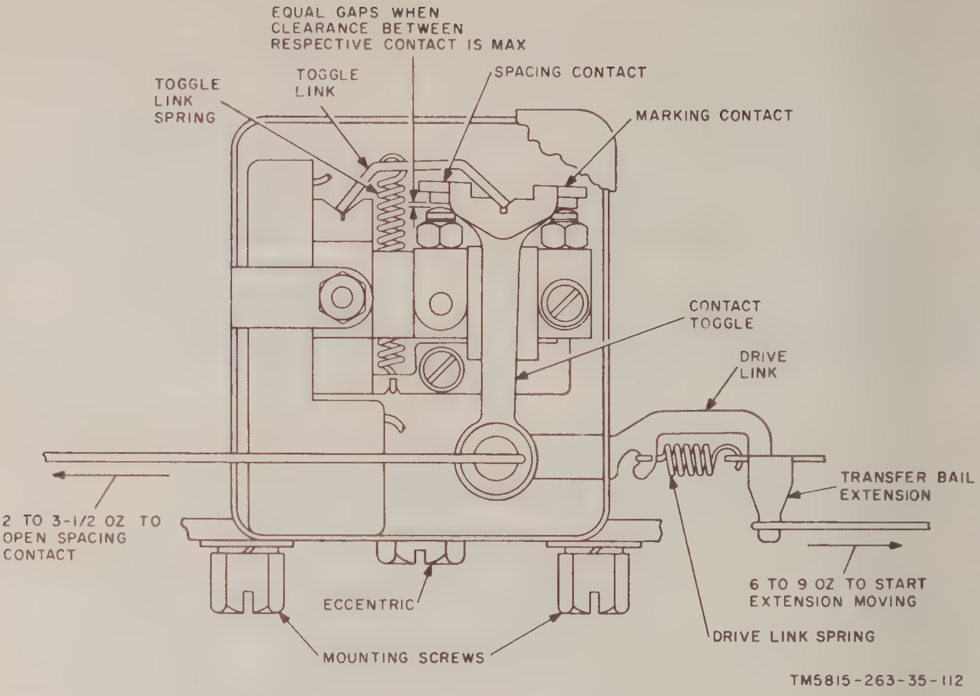

EQUAL GAPS WHEN CLEARANCE BETWEEN RESPECTIVE CONTACT IS MAX
TOGGLE LINK SPRING
TOGGLE LINK
SPACING CONTACT
MARKING CONTACT
CONTACT TOGGLE
DRIVE LINK
TRANSFER BAIL EXTENSION
2 TO 3-1/2 OZ TO OPEN SPACING CONTACT
6 TO 9 OZ TO START EXTENSION MOVING
ECCENTRIC
MOUNTING SCREWS
DRIVE LINK SPRING
TM5815-263-35-112

Figure 356. Signal contact box, top view.

spacing (A) position should be equal within .002 inch.

b. Method of Checking.

(1) Insert a piece of tape perforated with the "letters" combination in the unit. Measure and note the clearance for requirement *a*(1) above.

(2) Insert a piece of blank tape in the unit. Measure the clearance for requirement *a*(2) above and compare it with the clearance noted in *a*(1) above.

c. Adjustment. Loosen the mounting screws on the stabilizer plate (A). Position the stabilizer plate until requirement *a*(3) above is met. Tighten the mounting screws and recheck the adjustment. The latches should fall in when the other transfer levers cam the transfer bail. Where possible, use a signal distortion test set (par. 638*i*) to refine this adjustment after adjustment given in paragraph 577 is checked.

576. Transfer Bail Stabilizer Spring Tension (B, fig. 355)

a. Requirement. With the unit upright an the clutch disengaged, it should require 2½ t 5 ounces to start the stabilizer latch moving.

b. Method of Checking. Hook an 8-ounc scale on the left stabilizer latch just below th spring and pull horizontally to the left.

c. Adjustment. Replace the stabilizer sprin if it fails to meet the requirement.

577. Signal Contact Box Adjustment (fig. 356)

a. Requirement. The marking and spacin contact gaps must be equal when the clearanc between the respective contact is maximum a determined by engaging the clutch and ro- tating the main shaft slowly.

b. Adjustment. Remove the cover plate an top plate (par. 178*a*) and the contact bo cover (par. 143*b*(1)). Engage the clutch an

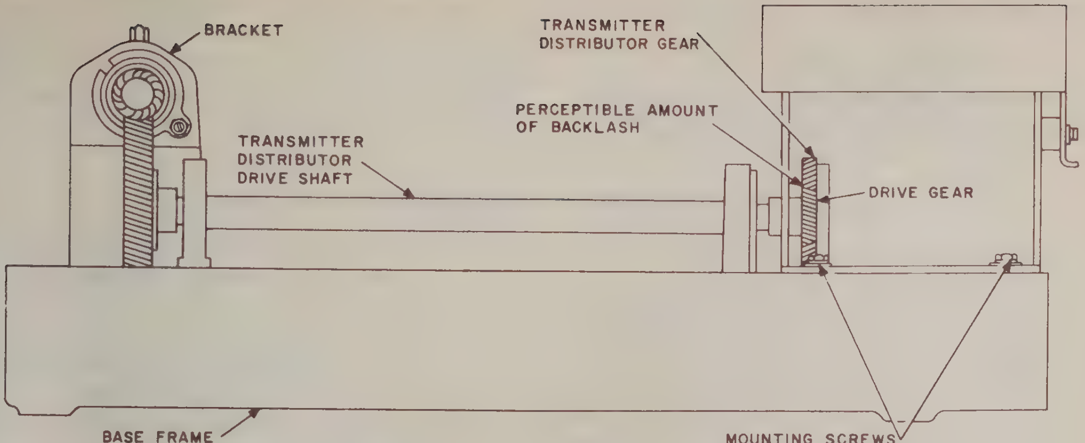

BRACKET
TRANSMITTER DISTRIBUTOR GEAR
PERCEPTIBLE AMOUNT OF BACKLASH
TRANSMITTER DISTRIBUTOR DRIVE SHAFT
DRIVE GEAR
BASE FRAME
MOUNTING SCREWS
TM5815-263-35-113

Figure 357. Transmitter distributor drive mechanism, left view.

rotate the main shaft slowly until there is maximum clearance between the contacts. Loosen the contact box mounting screws until friction tight and then position the contact box by adjusting the eccentric until the requirement is met. Tighten the mounting screws and recheck the adjustment. Replace the contact box cover and the cover plate (par. 178*a*) by reversing the procedure used in removal (par. 143*b*(1)).

Note. The adjustment should be checked with distortion test set, if available (par. 638*i*). Carefully refine the adjustment to eliminate all bias from the signals by equalizing the current-on and current-off intervals.

578. Toggle Link Spring Tension

a. Requirement. With the clutch disengaged it should require 2 to 3½ ounces to open the left (spacing) contact (fig. 356).

b. Method of Checking. Remove the cover plate (par. 178*a*) and the contact box cover (par. 143*b*(1)), unhook the drive link spring from the drive link, and move the transfer bail to the right (spacing position, fig. 353) so that both contacts on the contact toggle are closed. Hook an 8-ounce scale over the pivot screw and pull horizontally to the left (fig. 356). Replace the drive link spring. Replace the contact box cover by reversing the procedure used in removal (par. 143*b*(1)) and the cover plate (par. 178*a*) if the above requirement is met.

c. Adjustment (fig. 356). Replace the toggle link spring if it fails to meet the requirement.

579. Drive Link Spring Tension

a. Requirement (fig. 356). With the clutch disengaged, it should require 6 to 9 ounces to start the transfer bail extension moving.

b. Method of Checking. Remove the cover plate (par. 178*a*) and the contact box cover (par. 143*b*(1)). Unhook the stabilizer spring (fig. 353), and move the stabilizer latches away from the transfer bail extension. Hold the contact toggle firmly against the contacts and hook a 32-ounce scale over the end of the transfer bail extension (fig. 356). Pull horizontally to the right. Replace the stabilizer spring. Replace the contact box cover by reversing the procedure used in removal (par. 143*b*(1)) and the cover plate (par. 178*a*).

c. Adjustment. Replace the drive link spring if it fails to meet the requirement.

580. Transmitter Distributor Gear Backlash Adjustment

(fig. 357)

a. Requirement. There should be a perceptible amount of backlash between the transmitter distributor gear and the drive gear.

b. Method of Checking. With the transmitter distributor mounted on the base frame turn the transmitter distributor drive shaft in its normal direction of rotation, and notice the amount of backlash. Repeat this check a few times, at least, through one complete revolution.

c. *Adjustment.* Loosen two mounting screws that secure the left end of the transmitter distributor, and other mounting screw that secures the right end. Position the transmitter distributor to the left to decrease the amount of backlash, and to the right to increase the backlash. Tighten the mounting screws when the requirement is obtained, then recheck the adjustment.

Section XXIII. ADJUSTMENT OF REPERFORATOR UNIT

581. General

This section contains the requirements and adjustment procedures for the reperforator unit. Since the majority of adjustments for the perforator unit, given in section XIX, are common to the reperforator unit, only those adjustments peculiar to the reperforator unit are described in detail in this section. Reference is made to the specific adjustments in section XIX, which are applicable to the reperforator unit. Adjustments are arranged in the proper sequence for a complete readjustment of the unit. When making an individual adjustment, check all related adjustments. When it is necessary to remove parts or assemblies in order to make an adjustment, reference is made to the specific paragraphs for removal instructions.

a. *Removal.* Remove the reperforator unit as described in paragraph 86*a*.

b. *Replacement.* Replace the reperforator unit as described in paragraph 86*b*.

c. *Manual Operation of the Reperforator Unit.* To manually operate the reperforator when it is removed from the base, proceed as follows:

(1) Insert the flat-formed end of the armature clip (fig. 102) over the top of the selector armature (fig. 210) between the pole pieces, and hook the extruded projection under the edge of the armature. Hook the top end of the clip over the top of the selector-magnet terminal bakelite guard. The spring tension of the clip will hold the armature in the marking (attracted) position.

(2) Rotate the main shaft in a counterclockwise direction to bring the clutch to its partially disengaged (stop) position. The clutch does not fully disengage upon reaching the stop position. To relieve the drag on the clutch and permit the main shaft to rotate freely, apply pressure on the stop lug on the clutch cam disk (fig. 213) with a screwdriver to cause it to engage its latch lever and thus fully disengage the internal expansion clutch.

(3) Release the selector armature momentarily to permit the selector clutch to engage.

(4) Turn the main shaft slowly until all push levers have fallen to the left of their selector levers (fig. 212). Strip from the selector levers the push levers which are spacing in the code combination of the character or function that is being selected. Observe that the selector levers move in succession, starting from the inner (number one) selector lever. Continue to rotate the main shaft until all operations initiated by the selector action clear through the unit.

Note. The perforator unit is in the letters condition when the type wheel rack is in its upper position, the numerals appear on the top half of the type wheel and the letters push bar is in its extreme right position. The unit can be placed in the letters or figures condition by selecting the letters or figures code combinations.

582. Function Clutch Adjustments

Note. The clutch shoe lever spring tension given in the table below, should also be checked on the selector clutch.

Adjustment	Par. reference
Function Clutch Shoe Lever	370
Function Clutch End Play	371
Clutch Shoe Lever Spring Tension	372

583. Clutch Shoe Spring Tension
(B, fig. 230)

Note. This adjustment applies to the selector and function clutch shoe springs. In order to check the spring tension, it is necessary to remove the clutch from the main shaft. Therefore, it should not be checked unless there is good reason to believe that it does not meet the requirement. Remove the main shaft and clutch as described in paragraph 196*a*. After the spring tension has been checked (par. 373), reinstall the clutch and main shaft as described in paragraph 196*d*.

584. Selector Armature Adjustment
(fig. 209)

Note. To facilitate making the following adjustments, remove the range finder assembly and selector magnet assembly (par. 203*a*). To insure better operation pull a piece of clean bond paper between the selector armature and pole pieces to remove any oil or foreign matter that may be present. Make certain that no lint or pieces of paper remain between the pole pieces and selector armature.

a. Requirements.

(1) There should be .025- to .045-inch clearance between the armature clamp strip and casting (A).

(2) The outer edge of the armature should be flush within .015 inch with the outer edge of the pole pieces (B).

(3) The clearance between the sides of the armature backstop, and the sides of the armature extension (C) should not be less than .010 inch.

b. Method of Checking. Check requirements *a*(1) through (3) above with a round wire gage.

c. Adjustments.

(1) Position the armature spring adjusting nut (A) to hold the armature firmly against the pivot edge of the casting.

(2) Loosen the armature mounting screws (C) and position the armature and backstop to obtain requirements *a*(1) through (3) above. Remount the range finder assembly and the selector magnet assembly (par. 203*d*). Check the related adjustment described in paragraph 585.

585. Selector Magnet Bracket Adjustment
(fig. 210)

a. Requirements. When the selector armature is in contact with the front pole piece and the spacing lock lever is against a high part of its cam, the following requirements should be met:

(1) There should be .020- to .035-inch clearance between the end of the armature extension and shoulder of the spacing locking lever.

(2) There should be .001- to .003-inch clearance between the armature extension and lower surface of the spacing lock lever, when the lock lever is held downward.

b. Method of Checking. Measure the clearance specified in requirements *a*(1) and (2) above with feeler gages.

c. Adjustments.

(1) Loosen the two magnet bracket mounting screws and the adjusting link clamp screw. Position the magnet bracket by means of the adjusting link to obtain the requirement specified in *a*(1) above, then tighten the link clamp screw only.

(2) Position the upper end of the magnet bracket to obtain the requirement specified in *a*(2) above. Tighten the magnet bracket mounting screws and recheck the requirement described in *a*(1) above. Check the related adjustment described in paragraph 595.

586. Selector Armature Spring Tension
(A, fig. 211)

Note. The selector armature spring tension can be adjusted for maximum performance only when the reperforator unit is connected to the specific circuit over which it is to operate under normal service conditions. Since there are several operating speeds and since the circuits vary widely, the spring tension cannot be adjusted for maximum performance at this time. The spring tension requirements indicated below are to permit operation prior to measurement of receiving margins, when making distortion tolerance tests of the unit as described in paragraph 638*k*. Readjustment made to obtain satisfactory receiving margin should not be disturbed in order to meet the requirements of *a* below.

a. Requirements. When the marking lock lever, spacing lock lever, and start lever are on the high part of their cams, the following requirements should be met:

- (1) *0.060 ampere operation.* It should require 2½ to 3 ounces to move the selector armature to the marking position.
- (2) *0.020 ampere operation.* It should require 1½ to 2 ounces to move the selector armature to the marking position.

b. Method of Checking. Hook an 8-ounce scale over the end of the armature extension. Hold the scale as nearly vertical as possible when measuring the spring tension.

c. Adjustment. Position the adjusting nut to obtain requirement *a*(1) or (2) above.

587. Marking Lock Lever Spring Tension (B, fig. 211)

a. Requirement. When the letters combination is selected and the selector clutch is disengaged, it should require 1½ to 3 ounces to start the marking lock lever moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the lower extension of the marking lock lever to obtain the requirement.

c. Adjustment. Replace the marking lock lever spring if it fails to meet the requirement.

588. Selector Push Lever Spring Tension (A, fig. 212)

a. Requirement. When the push levers are in the spacing position, it should require ¾ to 1½ ounces to move each push lever from each selector lever.

b. Method of Checking. Set the typing unit upside down. Apply the push end of an 8-ounce scale to each push lever to obtain the requirement.

c. Adjustment. Replace any push lever spring that fails to meet the requirement.

589. Selector Lever Spring Tension (B, fig. 212)

a. Requirement. When the push lever reset bail is on the peak of its cam, it should require 1¼ to 2½ ounces to start each selector lever moving.

b. Method of Checking. Set the typing unit upside down. Apply the push end of an 8-ounce scale to each selector lever. If necessary, unhook the start lever spring (fig. 217) to check the No. 4 selector lever spring.

c. Adjustment. Replace any selector lever spring that fails to meet the requirement.

590. Selector Clutch Drum Adjustment (fig. 213)

a. Requirement. When the selector clutch is latched in the stopped position and the clutch drum against the shoulder on the main shaft, the selector cam-clutch assembly should have .001- to .010-inch end play.

b. Method of Checking. Check the clearance between the shoulder of the main shaft and the selector cam-clutch assembly with a flat feeler gage.

c. Adjustment. Loosen the clutch drum mounting screw and position the clutch drum to obtain the requirement; tighten the mounting screw.

591. Push Lever Reset Bail Spring Tension (fig. 214)

a. Requirement. When the push lever reset bail is against the low part of its cam, it should require 4 to 8 ounces to move the push lever reset bail from its cam.

b. Method of Checking. Apply the push end of a 32-ounce scale to the reset bail.

c. Adjustment. Replace the push lever reset bail spring if it fails to meet the requirement.

592. Selector Clutch Latch Lever Spring Tension (fig. 215)

a. Requirement. When the selector latch lever is against the low part of its cam, it should require 2 to 3½ ounces to start the selector clutch latch lever moving.

b. Method of Checking. Engage the latch lever with the hook end of an 8-ounce scale.

c. Adjustment. Replace the selector clutch latch lever spring if it fails to meet the requirement.

593. Spacing Lock Lever Spring Tension (fig. 215)

a. Requirement. When the selector armature is released and the spacing lock lever is against the low part of its cam, it should require 3 to 6 ounces to move the spacing lock lever from its pivot shaft.

b. Method of Checking. Apply the push end of an 8-ounce scale to the lower end of the spacing lock lever.

c. Adjustment. Replace the spacing lock lever spring if it fails to meet the requirement.

594. Range Finder Knob Phasing Adjustment (fig. 216)

a. Requirement. When the range finder knob is turned to either end of the rack, on the range finder sector, the zero mark on the scale should be within ±3 points of the scribed line on the range finder plate.

b. Adjustment. Remove the range finder knob mounting nut and disengage the knob from the rack. Position the knob to obtain the requirement, then reengage the knob and rack. Replace and tighten the mounting nut. Check the related adjustment given in paragraph 595.

595. Selector Clutch Stop Arm Adjustment (fig. 216)

a. Requirement. With the range scale set at 60, the selector clutch disengaged, and the selector armature in the marking position, the clutch stop arm should engage the clutch shoe lever by approximately the full thickness of the shoe lever.

b. Adjustments. Loosen the clutch stop arm clamp screw and position the clutch stop arm on the stop arm bail to obtain the requirement; tighten the clamp screw.

596. Start Lever Spring Tension (fig. 217)

a. Requirement. When the range scale set at 60 and the stop arm bail is in an indent of its cam, it should require 2½ to 4½ ounces to start the clutch stop arm moving.

b. Method of Checking. Unhook the latch lever spring. Apply the push end of an 8-ounce scale to the clutch stop arm.

c. Adjustment. Replace the start lever spring if it fails to meet the requirement.

597. Selector Cam Lubricator Adjustment (D, fig. 219)

a. Requirement.

(1) There should be a minimum clearance of .020 inch between the lubricator tube and the high part of the lock lever cam.

(2) The high part of the selector lever cams should touch the lubricator wick, but should not raise it by more than 1/32 inch.

b. Adjustment. Loosen two mounting screws and position the lubricator bracket to obtain the requirement; tighten the mounting screws.

Note. There should be some clearance between the marking lock lever spring and the oil reservoir.

598. Selecting and Function Mechanism Adjustments

Adjustment	Par. reference
Function Clutch Trip Lever	376
Reset Arm	377

599. Follower Adjustment (A, fig. 358)

a. Requirements. With the follower lever on the high part of the function trip cam, the following requirements should be met:

(1) There should be .010- to .030-inch clearance between the clutch release and the main trip lever.

(2) There should be .001-inch minimum clearance between the main trip lever and the left end of the slot in the down-stop bracket.

b. Method of Checking. Measure the clearance given in *a*(1) above with a round wire gage.

c. Adjustment. Loosen the locknut on the follower lever to friction tightness. By means of the pry point, position the adjusting arm on the follower lever to obtain requirements *a*(1) and (2) above; tighten the locknut. Check the related adjustments given in paragraphs 402 and 604.

600. Adjusting Arm Spring Tension (A, fig. 358)

a. Requirement. With the follower lever on the high part of the function trip cam and the main trip lever held away from the adjusting arm, it should require 2½ to 4 ounces to start the adjusting lever moving.

b. Method of Checking. Hook an 8-ounce scale over the spring lug on the adjusting arm and pull in a downward direction.

c. Adjustment. Replace the adjusting arm spring if it fails to meet the requirement.

601. Main Trip Lever Spring Tension (A, fig. 358)

a. Requirement. With the follower lever on the high part of the function trip cam, it should require 2½ to 4½ ounces to start the main trip lever moving.

b. Method of Checking. Hook an 8-ounce scale in the slot at the rear end of the reset bail and pull in a downward direction.

c. Adjustment. Replace the main trip lever spring if it fails to meet the requirement.

602. Punch Slide Latch Spring Tension (B, fig. 358)

a. Requirement. With the letters code combination selected, the main shaft rotated until the rocker bail is in its extreme left position, and the push levers stripped from the selector levers, it should require 1 to 3 ounces to start the punch slide latch moving.

b. Method of Checking. Apply the push end of an 8-ounce scale to the punch slide latch, at the right of the latch spring, and push in an upward direction. Measure the tension of five springs.

c. Adjustment. Replace any punch slide latch spring that fails to meet the requirement.

603. Function and Perforator Mechanism Adjustments

Adjustment	Par. reference
Rocker Bail	374
Rocker Bail Guide Bracket	375
Punch Position (Preliminary)	380
Rocker Arm	381
Drive Link Spring Tension	382
Punch Slide Downstop Position	383
Punch Pin Penetration	384
Punch Slide Guide Position	385
Punch Position (Final)	386

604. Reset Bail Trip Lever Adjustment (fig. 359)

a. Requirements.

(1) With the letters code combination selected, the main shaft rotated until the follower lever (A) is on the high part of the function trip cam and the punch slides positioned against the downstop plate (B), there should be .001- to .007-inch clearance between the lower edge of the punch slide and the top edge of the reset bail at the punch slide where the clearance is the least. Take up play in the reset bail so that the clearance between bail and punch slide is a minimum.

(2) With the selector and function clutch fully disengaged, the reset bail (C) should fully engage the notches in the punch slides when play is taken up in the direction to make the engagement the least.

b. Method of Checking. Measure the clearance given in *a*(1) above with a flat feeler gage.

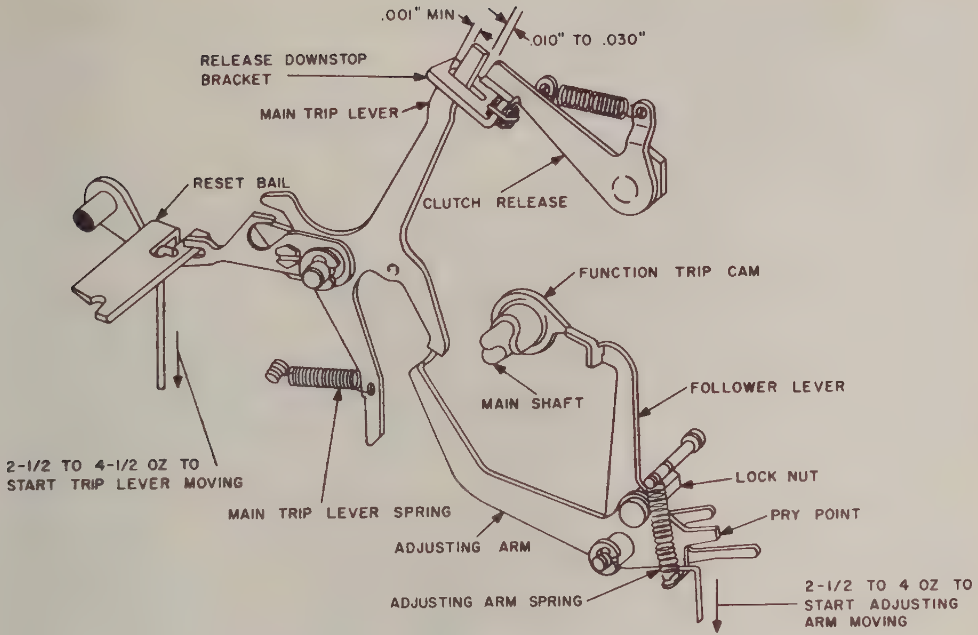
c. Adjustments.

(1) Loosen the clamp screw on the reset bail trip lever (B). Position the reset bail trip lever by means of the adjusting slot to obtain the requirement given in *a*(1) above; tighten the clamp screw.

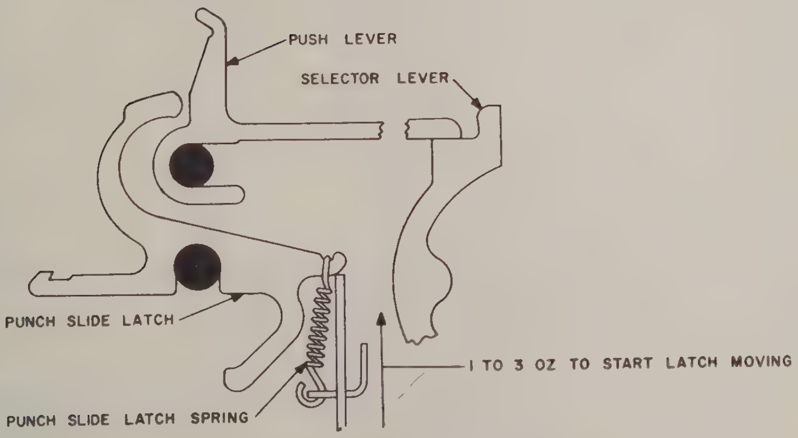
(2) Refine the adjustment given in (1) above to obtain the requirement given in *a*(2) above. Check the related adjustment given in paragraphs 387.

605. Punch, Positioning, Printing, and Ribbon Mechanism Adjustments

Adjustment	Par. reference
Punch Slide Reset Bail	387
Feed Pawl	388
Feed Hole Spacing (Preliminary)	389
Feed Hole Spacing (Final)	390
Detent Lever	391
Feed Hole Lateral Alignment	392
Punch Slide Spring Tension	393
Punch Pin Compression Spring and Retractor Bail Spring Tension	394
Tape Guide Spring (Tape Chute) Tension	395
Tape Guide Spring (Punch Block) Tension	396
Feed Pawl Spring Tension	397


.001" MIN
.010" TO .030"
RELEASE DOWNSTOP BRACKET
MAIN TRIP LEVER
RESET BAIL
CLUTCH RELEASE
FUNCTION TRIP CAM
MAIN SHAFT
FOLLOWER LEVER
LOCK NUT
PRY POINT
2-1/2 TO 4-1/2 OZ TO START TRIP LEVER MOVING
MAIN TRIP LEVER SPRING
ADJUSTING ARM
ADJUSTING ARM SPRING
2-1/2 TO 4 OZ TO START ADJUSTING ARM MOVING

A. FRONT VIEW


PUSH LEVER
SELECTOR LEVER
PUNCH SLIDE LATCH
1 TO 3 OZ TO START LATCH MOVING
PUNCH SLIDE LATCH SPRING

B. FRONT VIEW

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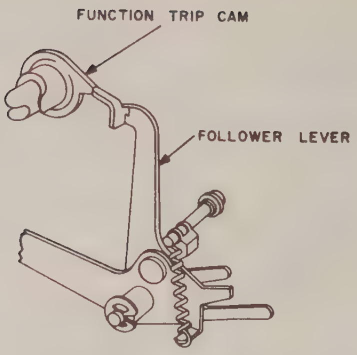
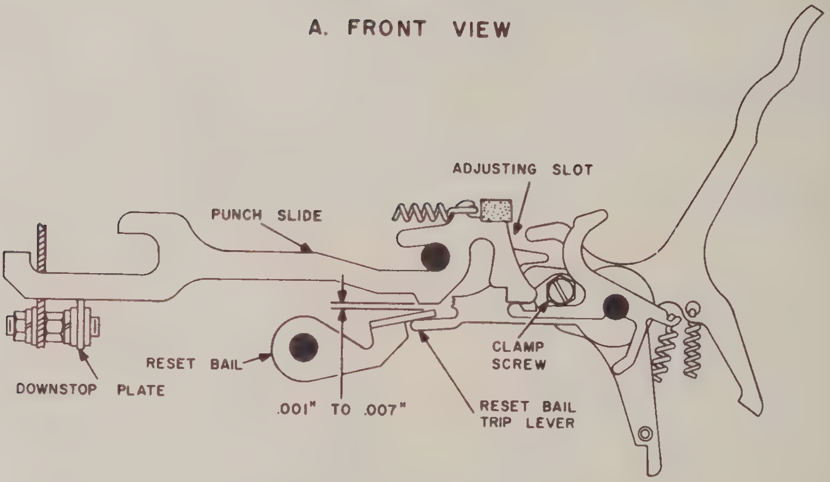
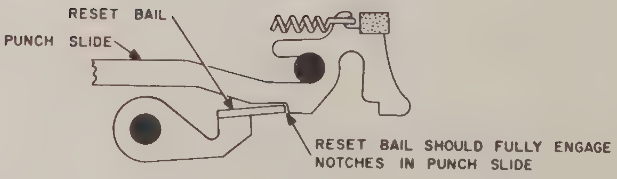
Figure 358. Function and selecting mechanism.


FUNCTION TRIP CAM
FOLLOWER LEVER

A. FRONT VIEW


ADJUSTING SLOT
PUNCH SLIDE
CLAMP SCREW
RESET BAIL
DOWNSTOP PLATE
.001" TO .007"
RESET BAIL TRIP LEVER

B. FRONT VIEW


RESET BAIL
PUNCH SLIDE
RESET BAIL SHOULD FULLY ENGAGE NOTCHES IN PUNCH SLIDE

C. FRONT VIEW

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Figure 359. Function mechanism.

Adjustment	Par. reference
etent Lever Spring Tension	398
ape Depressor Slide Spring Tension	399
ape Shoe Torsion Spring Tension	400
ape Guide	401
elease Downstop Bracket	402
ush Bar Operating Blade (Preliminary)	403
ush Bar Operating Blade (Final)	404
ell Crank Spring Tension	405
ocker Bail Pilot Stud	406
unction Clutch Latch Lever Spring Tension	407
unction Box	408
ransfer Mounting Bracket	409
etters and Figures Yield Arms	410
igures Arm Assembly Spring Tension	411
igures Extension Arm Spring Tension	412
etters Arm Assembly Spring Tension	413
etters Extension Arm Spring Tension	414
ifter Arm	415
ifter Arm Eccentric Screw	416
ock Lever	417
o. 5 Pulse Beam Spring Tension	418
ock Lever Trip Roller	419
oggle Link Spring Tension	420
unction Bail Blade Spring Tension	421
fter Spring Tension	422
orrecting Drive Link Spring Tension	423
scillating Drive Link	424
scillating Drive Bail	425
xial Sector Alignment	426
ccentric Shaft Detent Lever Spring Tension	427
xial Output Rack Guide Roller	428
ush Bar Guide Bracket	429
orrecting Drive Link	430
ler Gear Eccentric Shaft	431
otary Correcting Lever	432
ibbon Guide	433
rinting Trip Link	434
ccelerator Spring Tension	435
rinting Hammer Spring Tension	436
rinting Latch Spring Tension	437
rinting Trip Link Spring Tension	438
ypewheel	439
rint Hammer	440
ibbon Feed Pawl Spring Tension	441
ibbon Feed Adjusting Arm	442
ibbon Feed Drive Arm Spring Tension	443
ibbon Feed Pawl Downstop Eccentric	444
ibbon Ratchet Wheel Spring Washer	445
ibbon Adjusting Plate	446
ibbon Feed Reversing Arm Spring Tension	447
unction Clutch Release Spring Tension	449

606. Contact Mounting Bracket Adjustment (fig. 360)

a. Requirements.

(1) The contact assembly should be centrally located on the bell function blade insulator (A).

(2) With the letter S code combination selected and the bell function blade in the blocked position, there should be a .015- to .025-inch gap between the contact points (B).

(3) With the letter S code combination selected in the figures condition and the main shaft rotated until the bell function blade is selected, the contacts should close.

b. Method of Checking. Measure the clearance given in *a*(2) above with a round wire gage.

c. Adjustment. Loosen the mounting screws (A) on the contact mounting bracket. Position the bracket to obtain the requirements given in *a*(1) through (3) above, tighten the mounting screws.

607. Signal Bell Contact Adjustment (C, fig. 360)

a. Requirements.

(1) The lower contact spring should be approximately parallel to the top of the contact mounting bracket as gaged by eye.

(2) It should require 1½ to 2½ ounces to separate the contacts.

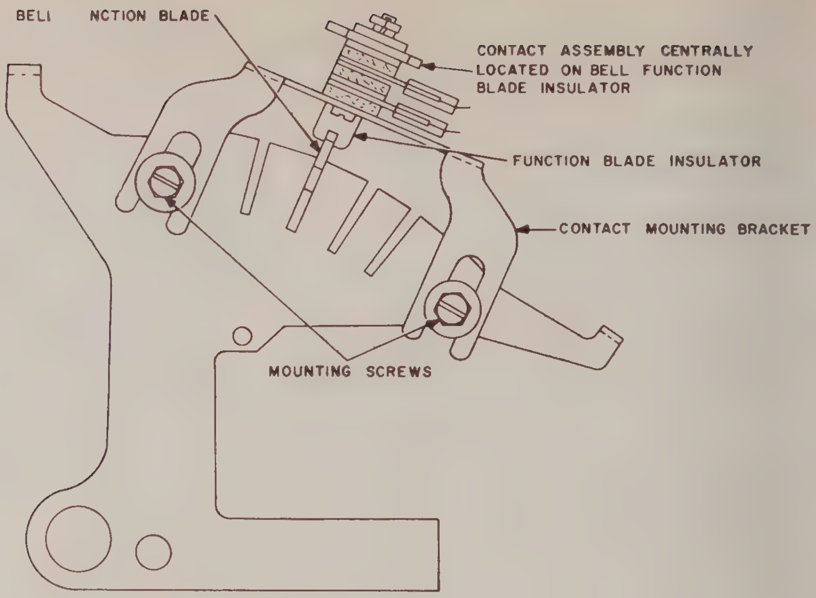
(3) The contact guard should be centrally located over the contact springs.

b. Method of Checking. To measure the spring tension given in *a*(2) above, select the letter S code combination in the figures condition. Rotate the main shaft until the contacts close. Hook an 8-ounce scale under the upper contact spring and pull in an upward direction.

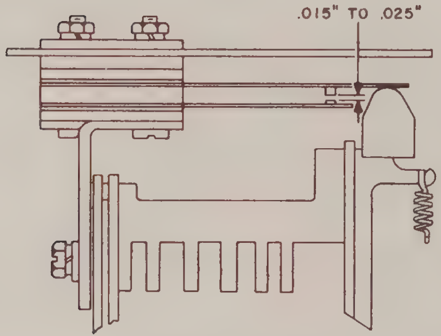
c. Adjustments.

(1) Bend the lower contact spring to obtain the requirement given in *a*(1) above.

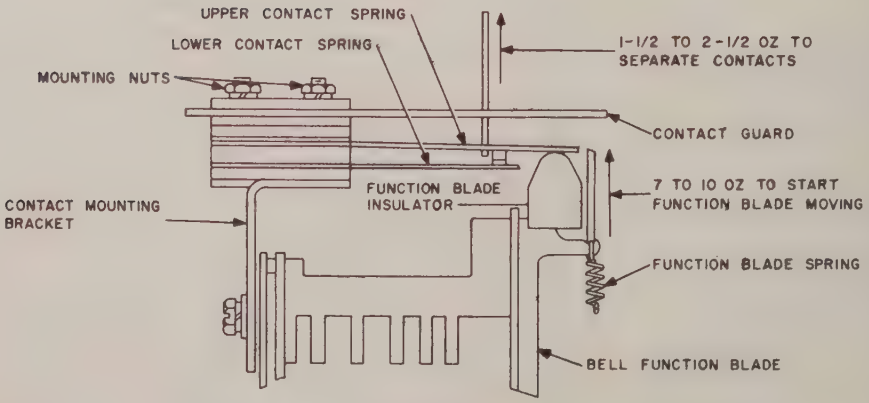
(2) Bend the upper contact spring to obtain the requirement given in *a*(2) above.


BELL FUNCTION BLADE
CONTACT ASSEMBLY CENTRALLY LOCATED ON BELL FUNCTION BLADE INSULATOR
FUNCTION BLADE INSULATOR
CONTACT MOUNTING BRACKET
MOUNTING SCREWS

A. RIGHT SIDE VIEW



B. REAR VIEW


UPPER CONTACT SPRING
LOWER CONTACT SPRING
MOUNTING NUTS
1-1/2 TO 2-1/2 OZ TO SEPARATE CONTACTS
CONTACT GUARD
FUNCTION BLADE INSULATOR
7 TO 10 OZ TO START FUNCTION BLADE MOVING
CONTACT MOUNTING BRACKET
FUNCTION BLADE SPRING
BELL FUNCTION BLADE

C. REAR VIEW

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Figure 360. Signal bell contact mechanism.

(3) Loosen the mounting nuts on the contact assembly. Position the contact guard to obtain the requirement given in *a*(3) above.

608. Function Blade Spring Tension (C, fig. 360)

a. Requirement. With the upper contact spring held away from the function blade insulator it should require 7 to 10 ounces to start the bell function blade moving.

b. Method of Checking. Hook a 32-ounce scale under the spring lug and pull in an upward direction.

c. Adjustment. Replace the function blade spring if it fails to meet the requirement.

Section XXIV. ADJUSTMENT OF REPERFORATOR BASE

609. General

This section contains the requirements and adjustment procedures for the reperforator base. Adjustments are arranged in the proper sequence for a complete readjustment of the base. When it is necessary to remove the reperforator base in order to make an adjustment, reference is made to the specific paragraphs for removal and replacements instructions.

610. Gear Guard Adjustment (A, fig. 361)

a. Requirement. The gear guard should align with the speed indicator plate.

b. Adjustment. Loosen the gear guard mounting screws and position the guard to meet the requirement. Tighten the mounting screws.

611. Speed Indicator Plate Adjustment (A, fig. 361)

a. Requirement. When the speed selector lever is detented in the 100 words per minute position, the mark on the speed indicator plate shall align with the mark on the gear shift slide block.

b. Method of Checking. Check the requirement visually after placing the speed selector lever in the 100 word per minute position.

c. Adjustment. Loosen two mounting screws in the speed indicator plate and position the plate to meet the requirement. Tighten the mounting screws.

612. Gear Shift Assembly Gear Mesh Adjustment (fig. 361)

Caution: **Do not shift gears while the reperforator is operating under power.**

a. Requirement. With the speed selector lever (B) detented in the 100 word per minute position, the drive gear and driven gear should mesh fully, and the edge of each gear should be approximately in line. The sliding surfaces of the gear shift assembly and gear shaft should not bind.

b. Method of Checking. Push the speed selector lever down and move the lever right or left to determine whether the sliding surfaces of the gear shift assembly and gear shaft bind. Place the lever in the 100 word per minute position and check visually whether the driven and drive gear are meshed fully and are approximately in line.

c. Adjustment. With the speed selector lever in the 100 word per minute position, loosen the two gear guard mounting screws (A) until friction tight. Loosen the gear shift assembly mounting studs until friction tight and move the gear shift assembly to the left or right until the requirement is met. Tighten the gear shift assembly mounting studs. Tighten the two gear guard mounting screws when the gear guard meets the required adjustment (par. 610).

613. Motor Drive Gear and Main Driven Gear Backlash Adjustment

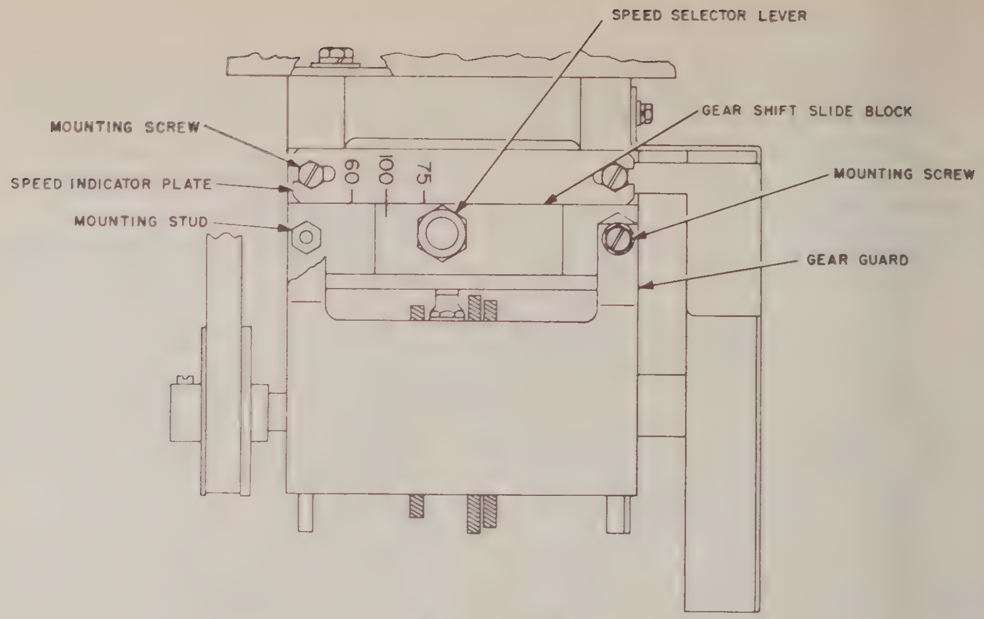
a. Requirement.

(1) There should be a barely perceptible amount of backlash between the motor drive gear (A, fig. 362) and the main driven gear at the point where the backlash is the least.

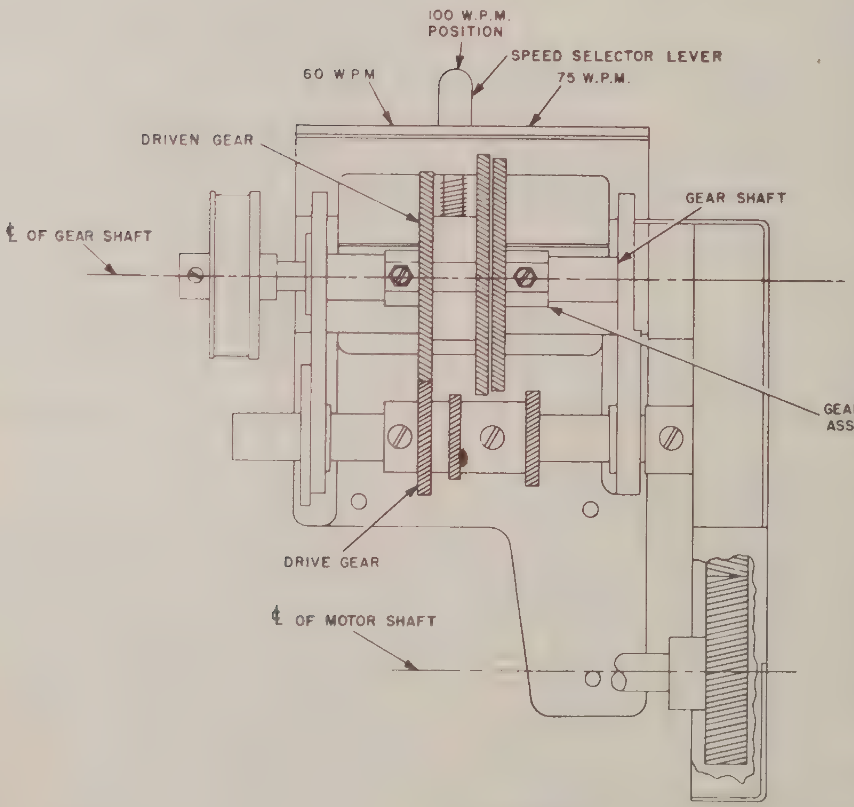
(2) The centerline of the motor shaft (B, fig. 361) should be parallel to the centerline of the gear shaft.

b. Method of Checking.

(1) Rotate the motor fan in the normal direction of rotation. During one complete revolution check the gear mesh until the point of least backlash is noted.


SPEED SELECTOR LEVER
MOUNTING SCREW
GEAR SHIFT SLIDE BLOCK
SPEED INDICATOR PLATE
60
100
75
MOUNTING SCREW
MOUNTING STUD
GEAR GUARD

A. TOP VIEW


100 W.P.M.
POSITION
SPEED SELECTOR LEVER
60 W P M
75 W.P.M.
DRIVEN GEAR
GEAR SHAFT
℄ OF GEAR SHAFT
GEAR SHIFT
ASSEMBLY
DRIVE GEAR
℄ OF MOTOR SHAFT

B. REAR VIEW

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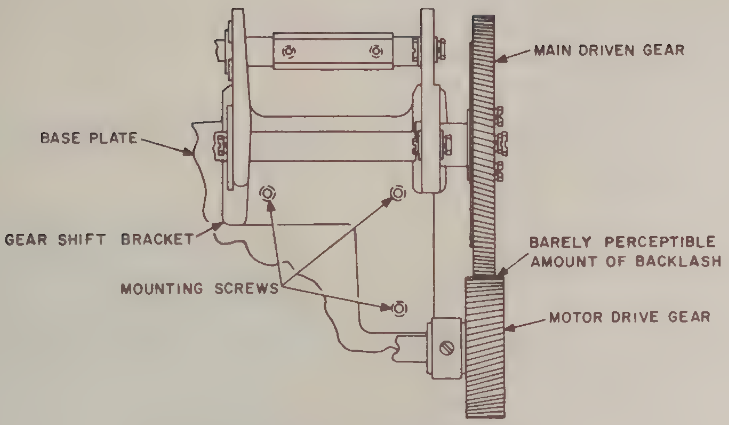
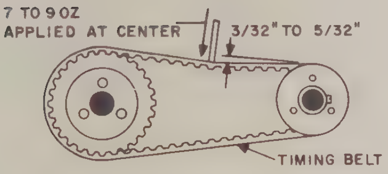
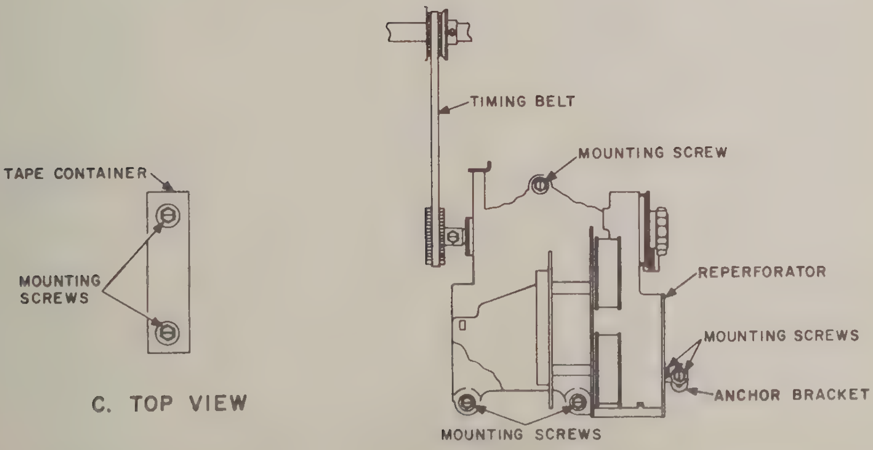
Figure 361. Variable speed drive mechanism.


MAIN DRIVEN GEAR
BASE PLATE
GEAR SHIFT BRACKET
BARELY PERCEPTIBLE AMOUNT OF BACKLASH
MOUNTING SCREWS
MOTOR DRIVE GEAR

A. REAR VIEW


7 TO 9 OZ APPLIED AT CENTER
3/32" TO 5/32"
TIMING BELT

B. RIGHT SIDE VIEW


TAPE CONTAINER
MOUNTING SCREWS
TIMING BELT
MOUNTING SCREW
REPERFORATOR
MOUNTING SCREWS
ANCHOR BRACKET
MOUNTING SCREWS

C. TOP VIEW

D. TOP VIEW

TM5815-263-35-125

Figure 362. Variable speed drive mechanism and timing belt.

(2) Check requirement $a(2)$ above visually (B, fig. 361).

c. Adjustment. Remove the perforator as described in paragraph 83*a*. Loosen the mounting screws (A, fig. 362) that secure the gear shift bracket to the base plate. Position the gear shift bracket to meet the requirements. Tighten the mounting screws. Check the timing belt adjustment (par. 614). Replace the perforator as described in paragraph 84*b*.

614. Timing Belt Adjustment
(fig. 362)

a. Requirement. It should require a pressure of 7 to 9 ounces to deflect the timing belt (B) $\frac{3}{32}$ to $\frac{5}{32}$ inch.

***Caution:* The belt should not be tight.**

b. Method of Checking. Apply the push end of a 32-ounce scale, at the center of the span perpendicular to the timing belt, and push downward. Measure the amount of deflection.

c. Adjustment. Loosen the two anchor bracket mounting screws (D) and the three reperforator mounting screws and position the reperforator unit to meet the requirement. Tighten the three mounting screws. Press the anchor bracket against the base plate and tighten the screw securing the anchor bracket to the reperforator unit. Tighten the screws securing the anchor bracket to the base plate.

615. Tape Container Adjustment
(C, fig. 362)

a. Requirement. It must be possible to insert a full roll of tape into the tape container through the reperforator access door in the dome.

b. Adjustment. Loosen the two tape container mounting screws and position the tape container. Tighten the screws. Close the dome, open the reperforator access door, and to check, remove or insert a roll of tape. Readjust if necessary.

616. Tape Guide Adjustment
(fig. 363)

a. Requirement. The front and rear ends of the tape guide should align with the punch mechanism tape opening and with the hole in the reperforator control panel. The tape guide

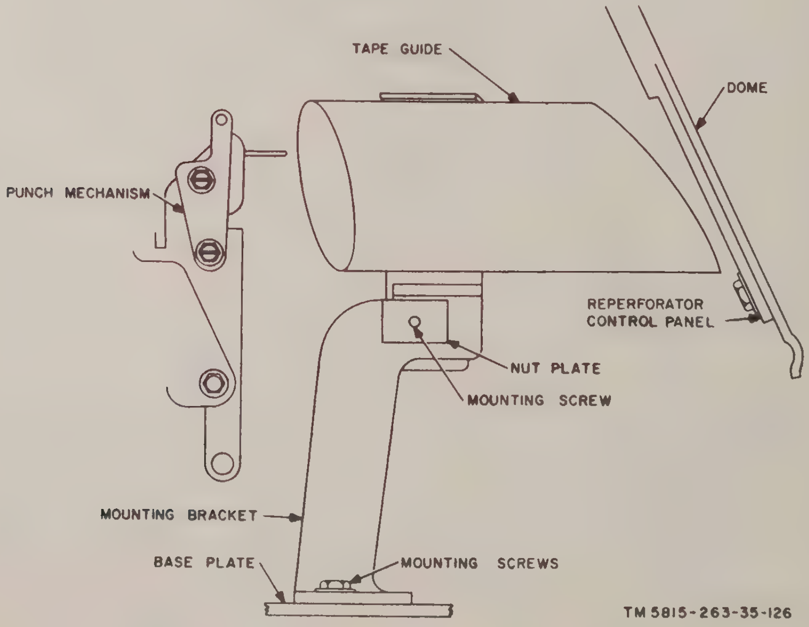


Figure 363. Tape guide, left view.

should not touch the reperforator unit or cabinet and the tape should feed without binding or twisting.

b. Method of Checking. With the perforator unit and reperforator access doors open, visually check the alignment and clearance requirement. Operate the reperforator and notice whether the tape binds or twists.

c. Adjustment. Loosen the mounting screws that secure the mounting bracket to the base plate. Position the tape guide until it is horizontally positioned. Tighten the mounting screws. Loosen the mounting screw that secures the tape guide to the nut plate. Position the tape guide until it is positioned vertically. Tighten the screws.

Section XXV. ADJUSTMENT OF CABINET

617. General

This section contains the tolerance requirements, adjustment procedures, and spring tension checks for the AN/FGC–56 and AN/FGC–58 Teletypewriter Set cabinets. Adjustment procedures are arranged in a proper sequence for a complete readjustment of the cabinets. When making individual adjustments, check all related adjustments. Where it is necessary to remove parts or subassemblies to make an adjustment, reference is made to specific paragraphs for removal and replacement instructions.

618. Dome Adjustment

a. Requirement.

(1) The dome should be centered on the cabinet (A, fig. 364) from right to left and the front face of the center channel containing the left indicator light (B, fig. 365) lens of the dome should be approximately .001 to .050 inch to the rear of the front edge of the cabinet (A, fig. 364).

(2) With the dome closed and touching the cabinet, there should be .001- to .015-inch clearance between the latching surface of each dome latch (B, fig. 364) and the cabinet latching surface. The dome should rest along the top front edge of the cabinet (the front panel and the crossbar) with some light showing toward the rear along the top flange of the sides toward the dome hinge (A, fig. 364).

b. Method of Checking.

(1) With the dome closed, measure the distance that the dome rests from the right and left edge of the cabinet to determine whether the cabinet is centered (*a*(1) above). Measure whether the dome center channel is not more than .050 inch from the front edge of the cabinet.

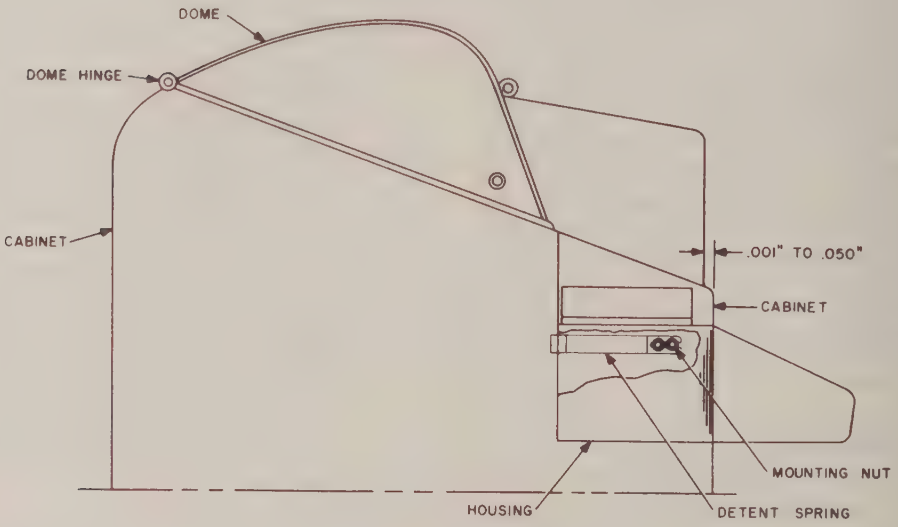
(2) Remove the typing unit (par. 79*a*) and close the dome. Open the copy window and copy access door (B, fig. 365) to measure the clearance (*a*(2) above) of the right dome latch (B, fig. 364) with a round wire gage. Close the copy access door and copy window. Replace the typing unit (par. 79*b*). Remove the blank control panel (B, fig. 365) (AN/FGC–56 only) or the reperforator control panel (AN/FGC–58 only) by removing the three mounting screws. Measure the clearance of the left dome latch with a round wire gage. Replace the control panel.

c. Adjustment.

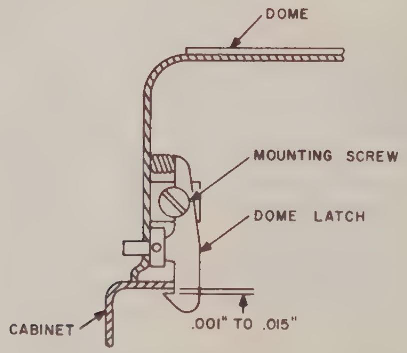
(1) Remove the screw that secures the dome stop arm assembly to the cabinet. Then pivot the dome as far as it will go, pry the ends of the torsion bars (A, fig. 364) out of the dome holes, and slip the bars from the dome brackets. Loosen the nine screws that secure the dome hinges to the rear flange of the cabinet. Center and adjust the dome until requirement *a*(1) above is met. Tighten the nine screws. Replace the free ends of the torsion bars by sliding the straight portion of the bars under the bracket on the gusset in the corners of the dome until the bent end of the bar slips into the retaining hole in front of the bracket. Pivot the dome forward, position the dome stop arm assembly and replace the screw that secures the stop arm to the cabinet.

(2) Depress the dome release pushbuttons. Open the dome and loosen the mounting screw on the right or left dome latch (B, fig. 364). Adjust the latch until requirement *a*(2) above is met. Tighten the mounting screw. Loosen the locknut that secures each rubber bumper to the underside of the dome.

Note. There are three rubber bumpers mounted on the underside of the dome. One at each end panel and the third on a bracket located approximately at the center of the front edge of the dome (B, fig. 365). Adjust each rubber bumper so that there is .030- to .045-inch clearance between the bottom edge of the dome close to the front and the top surfaces of the side panel flanges without pressure. Tighten the locknuts. This adjustment provides a slight compression of the rubber bumpers. Readjust if necessary.


DOME
DOME HINGE
CABINET
.001" TO .050"
CABINET
MOUNTING NUT
HOUSING
DETENT SPRING

A. LEFT VIEW


DOME
MOUNTING SCREW
DOME LATCH
CABINET
.001" TO .015"

B. RIGHT VIEW

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Figure 364. Cabinet dome and transmitter distributor housing.

9. Torsion Bar Adjustment
(A, fig. 365)

a. Requirement. The torsion bars should lift e dome above the front edge of the cabinet to 7 inches when the dome release pushbutton depressed.

b. Method of Checking. Depress the push- tton and measure distance.

c. Adjustment. Loosen the locknuts on the wer end of the eyebolts and turn the shoulder t clockwise to increase the spring torque and unterclockwise to decrease the spring torque. ove the eyebolts on both the left or right le by equal amounts. Tighten the locknuts ter both torsion bars have been adjusted.

0. Copy Access Door
(B, fig. 366)

a. Requirement. The copy access door should st flush and be centered on the dome from t to right.

b. Method of Checking. Measure the distance om the right and left edge of the dome to termine if the door is centered. Check ually when the lid is closed to determine t rests against the dome.

c. Adjustment. Open the copy window and e copy access door. Remove the copy access or stop arm screw on the dome bracket and en the door as far as it will go. Loosen the screws that secure the dome hinge to the me and position the copy access door until e requirement is met. Tighten the six screws d replace the stop arm screw. Close the py access door and recheck. Readjust if cessary. Check the copy window adjustment ar. 621).

1. Copy Window Adjustment

a. Requirement.

(1) The right and left edges of the copy window (B, fig. 365) must be even with the copy access door edges. The copy window must rest flush on the horizontal surface of the dome.

(2) When the copy window is opened or closed, the plastic window must clear the paper guide by 1/16 inch (A, fig. 366).

b. Method of Checking. Visually check the above requirements.

c. Adjustment.

(1) Remove the typing unit (par. 79*a*). Close the dome and remove the locknut, latch thumbscrew, spring, and the latch (B, fig. 366). Loosen the four nuts that secure the hinges, on the copy window, to the dome and position to the copy window to meet requirement *a*(1) above. Tighten the four nuts and try closing the copy window again; readjust if necessary. Replace the latch with the spring, the screw and nut on both latch brackets. Replace the typing unit (par. 79*a*).

(2) Open the copy window and loosen the mounting screws (A, fig. 366) on two clamps which secure the plastic window. Position the window until requirement *a*(2) above is met. Tighten the mounting screws.

622. Perforator Access Door Adjustment

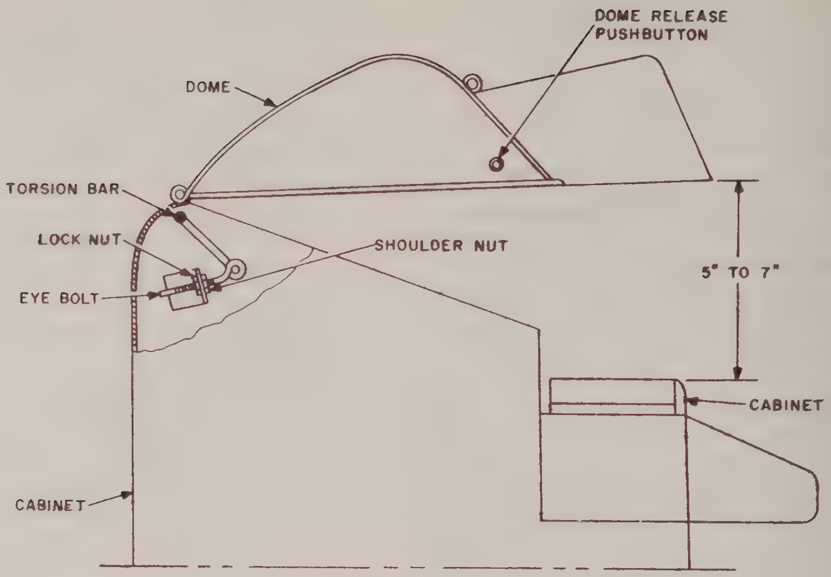
a. Requirement (B, fig. 365). The right and front edge of the perforator access door must rest flush against the cabinet edges and the left edge flush against the reperforator access door.

b. Method of Checking. Visually check the above requirement.

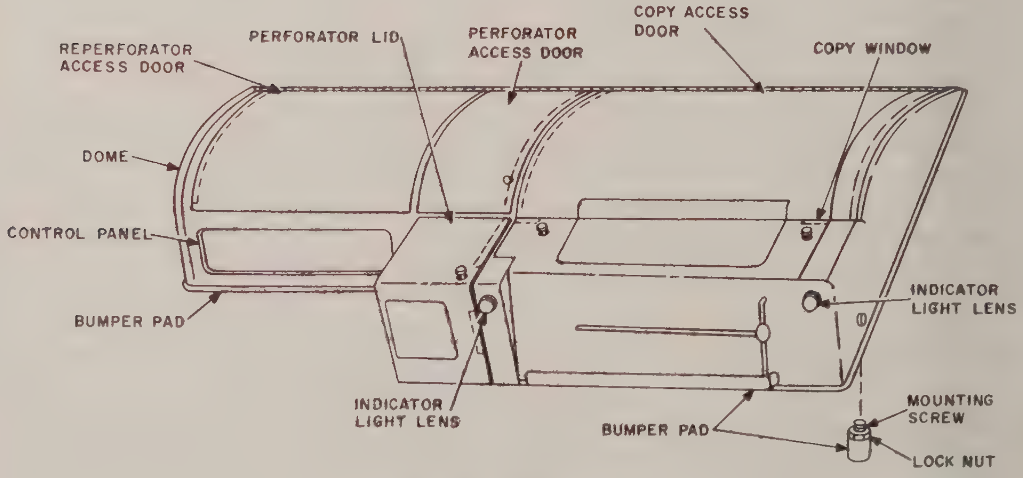
c. Adjustment (B, fig. 366). Remove four mounting screws that secure the perforator tape container to its mounting bracket. Remove the tape container and close the dome. Open the perforator access door and remove the nut, latch thumbscrew, spring, and the latch. Loosen the three screws that secure the hinges to the dome. Position the perforator access door to meet the above requirement. Tighten the three screws and try closing the door again, readjust if necessary. Replace the latch with the spring, the screw and nut on the latch bracket. Replace the tape container and the four mounting screws.

623. Reperforator Access Door Adjustment
(B, fig. 365)

a. Requirement. The left edge and the front edge of the reperforator access door must rest flush against the dome.


DOME RELEASE PUSHBUTTON
DOME
TORSION BAR
LOCK NUT
SHOULDER NUT
EYE BOLT
5" TO 7"
CABINET
CABINET

A. LEFT VIEW


REPERFORATOR ACCESS DOOR
PERFORATOR LID
PERFORATOR ACCESS DOOR
COPY ACCESS DOOR
COPY WINDOW
DOME
CONTROL PANEL
BUMPER PAD
INDICATOR LIGHT LENS
INDICATOR LIGHT LENS
MOUNTING SCREW
BUMPER PAD
LOCK NUT

B. TOP FRONT VIEW

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Figure 365. Torsion bar, copy access door, copy window, perforator access door, and reperforator access door.

b. Method of Checking. Check visually if the quirement is met.

c. Adjustment. Open the perforator access oor and reperforator access door. Loosen the ree screws that secure the hinge to the dome. osition the door until the requirement is met. ighten the three screws.

24. Perforator Lid Adjustment
(B, fig. 366)

a. Requirement.

(1) The right edge of the perforator lid must rest flush against the top surface of the center channel of the dome.

(2) The torsion spring should raise the lid upward until it is stopped by the stop guide before it reaches a vertical position.

(3) The lid latch should have sufficient latching surface on its bracket and should hold the door reasonably tight.

b. Method of Checking.

(1) Check requirement *a*(1) above visually when the lid is closed.

(2) Open the lid and check the requirement (*a*(2) above) visually.

(3) Check the requirement (*a*(3) above) visually when the dome is open and the lid closed and check if a reasonable amount of force is required to unlatch the lid.

c. Adjustment. Open the lid and perform he following adjustments.

(1) Remove the locknut, latch thumbscrew, spring and latch. Remove the stop guide mounting screws, the stop guide and torsion spring. Loosen the three screws that secure the hinge to the dome. Position the lid to meet requirement *a*(1) above. Tighten the three screws. Replace the latch and related parts and the torsion spring and related parts and adjust as instructed in (2) and (3) below.

(2) Loosen the nut to free the torsion spring anchor post and rotate the post until the required lifting power in requirement *a*(2) above is met.

(3) Loosen the adjusting bracket mounting screws and position the bracket until the latch has sufficient bite to meet requirement *a*(3) above. Bend the bracket up or down to adjust for proper latch tension of door against the rubber bumpers.

625. Paper Guide Adjustment

a. Requirement. With copy access door and copy window closed (B, fig. 365), the bottom edge of the paper guide (A, fig. 366) must be flush with the bottom surface of the copy window.

b. Method of Checking. Visually check the requirement.

c. Adjustment. Open the copy window and the copy access door (B, fig. 365). Loosen the three mounting screws (A, fig. 366) that secure the paper guide to the copy access door. Tighten the screws.

626. Copyholder Adjustment
(A, fig. 367)

a. Requirement. The tension of the line guide must be just sufficient to hold the copy in place and it must prevent the line guide from slipping down its shaft.

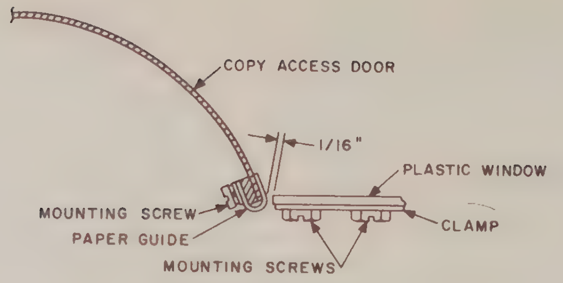
b. Adjustment. Remove the two mounting screws from inside the dome to free the square shaft with the line guide, while holding the shaft with the line guide in its position to prevent the spring tension from being released. While pressing the line guide against the dome, turn the shaft either to increase or decrease the tension, replace the shaft in position, and tighten the mounting screws.

627. Indicator Lamp Adjustment
(B, fig 367)

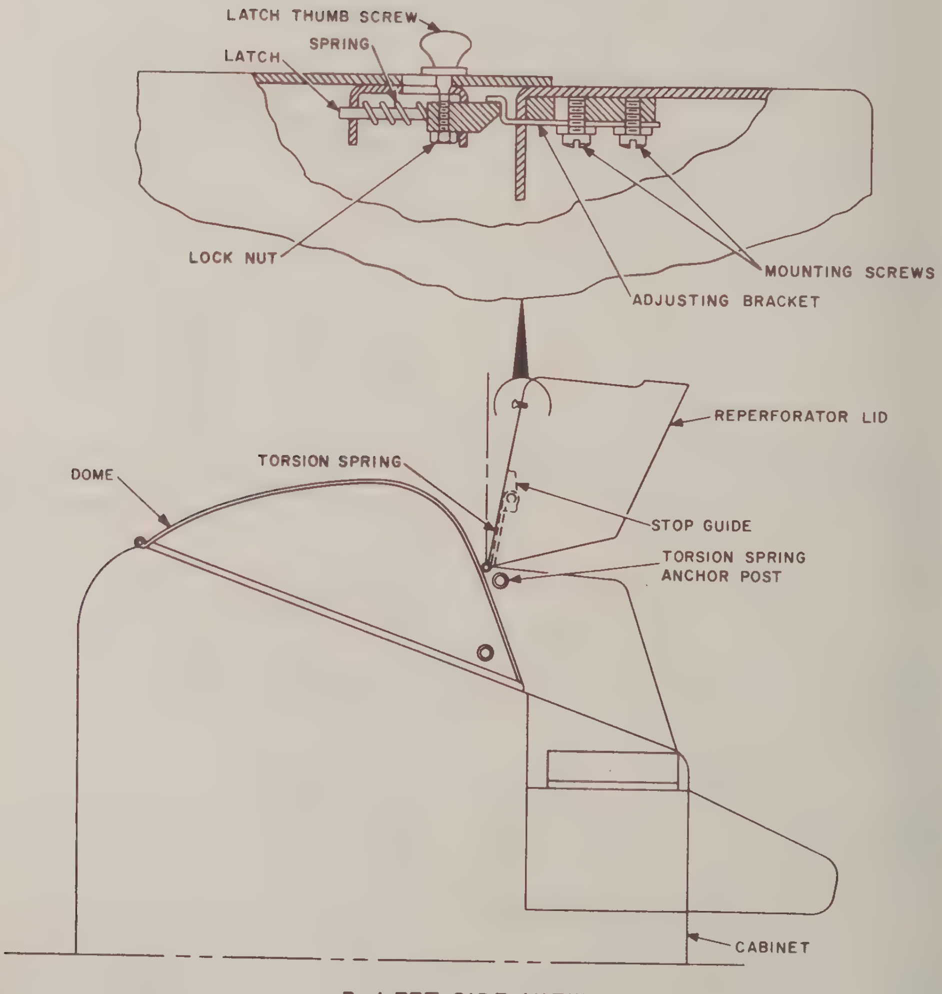
a. Requirement. The clearance between the end-of-line indicator lamp (DS4) and the indicator light lens should be at least 1/16 inch.

b. Method of Checking. Check the requirement with a round wire gage.

c. Adjustment. Loosen the mounting nut that secures the lampholder to the bracket. Position the lampholder until the requirement is met; tighten the mounting nut.


COPY ACCESS DOOR
1/16"
PLASTIC WINDOW
MOUNTING SCREW
PAPER GUIDE
CLAMP
MOUNTING SCREWS

A. LEFT SIDE VIEW


LATCH THUMB SCREW
SPRING
LATCH
LOCK NUT
MOUNTING SCREWS
ADJUSTING BRACKET
REPERFORATOR LID
TORSION SPRING
DOME
STOP GUIDE
TORSION SPRING ANCHOR POST
CABINET

B. LEFT SIDE VIEW

TM5815-263-35-121

Figure 366. Copy window, reperforator lid, and paper guide.

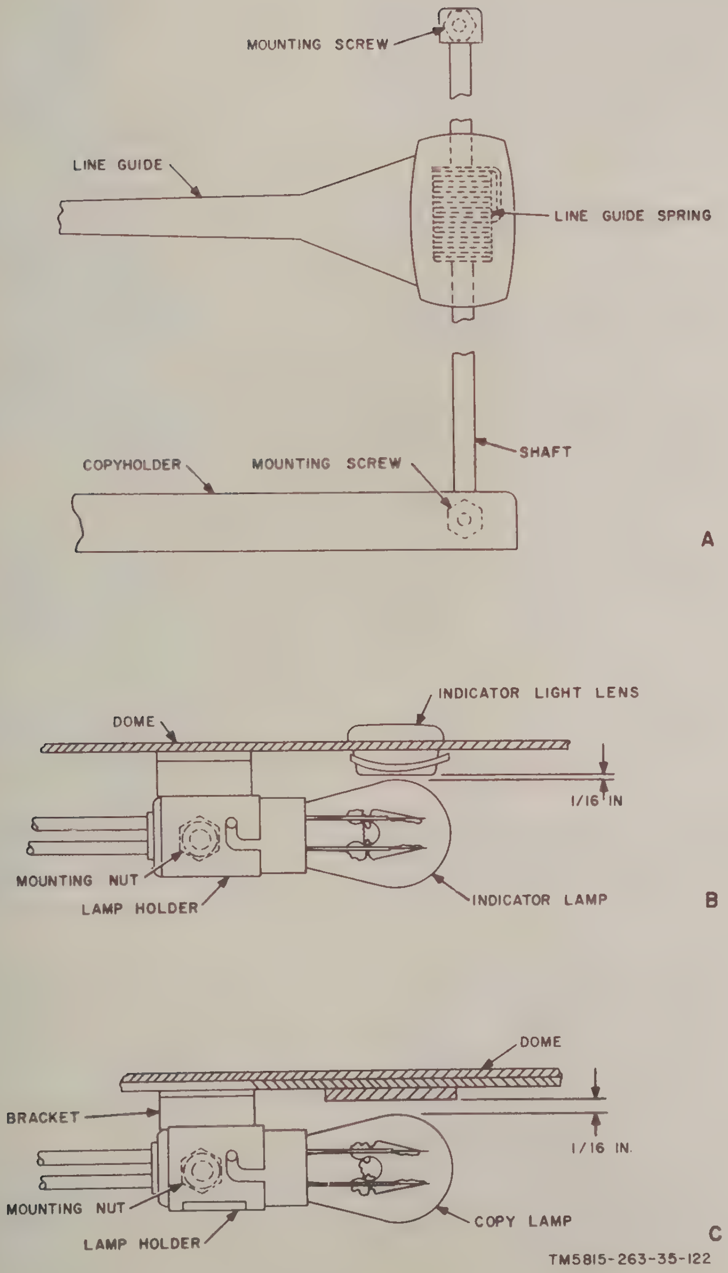

MOUNTING SCREW
LINE GUIDE
LINE GUIDE SPRING
SHAFT
COPYHOLDER
MOUNTING SCREW
A
INDICATOR LIGHT LENS
DOME
1/16 IN
MOUNTING NUT
LAMP HOLDER
INDICATOR LAMP
B
DOME
BRACKET
1/16 IN.
MOUNTING NUT
COPY LAMP
LAMP HOLDER
C
TM5815-263-35-122

Figure 367. Copyholder, indicator lamp, and copy lamp.

628. Copy Lamp Adjustment
(C, fig. 367)

a. Requirement. The clearance between the copy lamps (DS2 and DS3) and the dome, should be at least 1/16 inch.

b. Method of Checking. Check the requirement with a round wire gage.

c. Adjustment. Loosen the mounting nut that secures the lampholder to the bracket. Position the lampholder until the requirement is met.

629. Transmitter Distributor Housing Adjustment
(fig. 364)

a. Requirement. The transmitter distributor housing should fit securely when placed in position.

b. Method of Checking. Position the housing against the cross bar, noting that the housing detents securely in position.

c. Adjustment. Slightly loosen the two mounting nuts on each detent spring. Move the detent springs in or out on their respective mounting screws until the housing fits securely when detented into position; tighten the mounting nuts.

630. Cradle Adjustment
(fig. 368)

a. Requirement.

(1) Under normal load, the top of the front and rear rails (A) should be 2.000 ± .032 inches from the cabinet shelf.

(2) The front rail (B) should be positioned 3.344 ± .032 inches from the parallel to the front of the cabinet.

b. Method of Checking. Remove the typing unit (par. 79*a*), the keyboard base (par. 82*a*), the electrical service unit (par. 83*a*), reperforator base (par. 85*a*, AN/FGC–58 only), the transmitter distributor (par. 89*a*) and the transmitter distributor base (par. 90*a*). Measure the distances in the requirements.

c. Adjustment.

(1) Perform either one or both of the following adjustments:

(*a*) Loosen the locknuts on the vibratio dampeners numbered 1, 2, and 3 o top of the left and right rails Loosen the nut on the lower end o the stud (B) in vibration dampene number 4. Raise or lower the cradl assembly by turning the adjustin studs until the front and rear rail meet the height in requirement *a*(1 above. Tighten the locknuts whil holding the adjusting studs in posi tion.

(*b*) Loosen the four mounting screw holding the front and rear rails an the two screws securing the eccentrics on the left and right rails Move the front rail forward or rearward until the requirement in *a*(2) above is met. Tighten the fou mounting screws and then positio the eccentrics against the rear edge of the rear rail. Tighten the eccentric screws.

(2) Replace the electrical service unit (par. 83*b*), the keyboard base (par. 82*b*), the transmitter distributor base (par. 90*b*), the transmitter distributor (par. 89*b*), the complete reperforator assembly (par. 85*b*, AN/FGC–58 only), and the typing unit (par. 79*b*).

631. Signal Bell Adjustment
(D, fig. 368)

a. Requirement. With the armature held against the magnet core, the clearance between the armature clapper and bell should be .020- to .035-inch.

b. Method of Checking. Remove the keyboard base (par. 82*a*), open the lower access door, and remove the three signal bell mounting screws, flat washers, and grommets to free the signal bell. Measure the clearance with a round wire gage.

c. Adjustment. Bend the armature extension just below the armature spring until the requirement is met. Check the signal bell armature spring tension (par. 632). Replace the signal bell, grommets, flat washers, and mounting screws. Close the lower access door and replace the keyboard base (par. 82*b*).

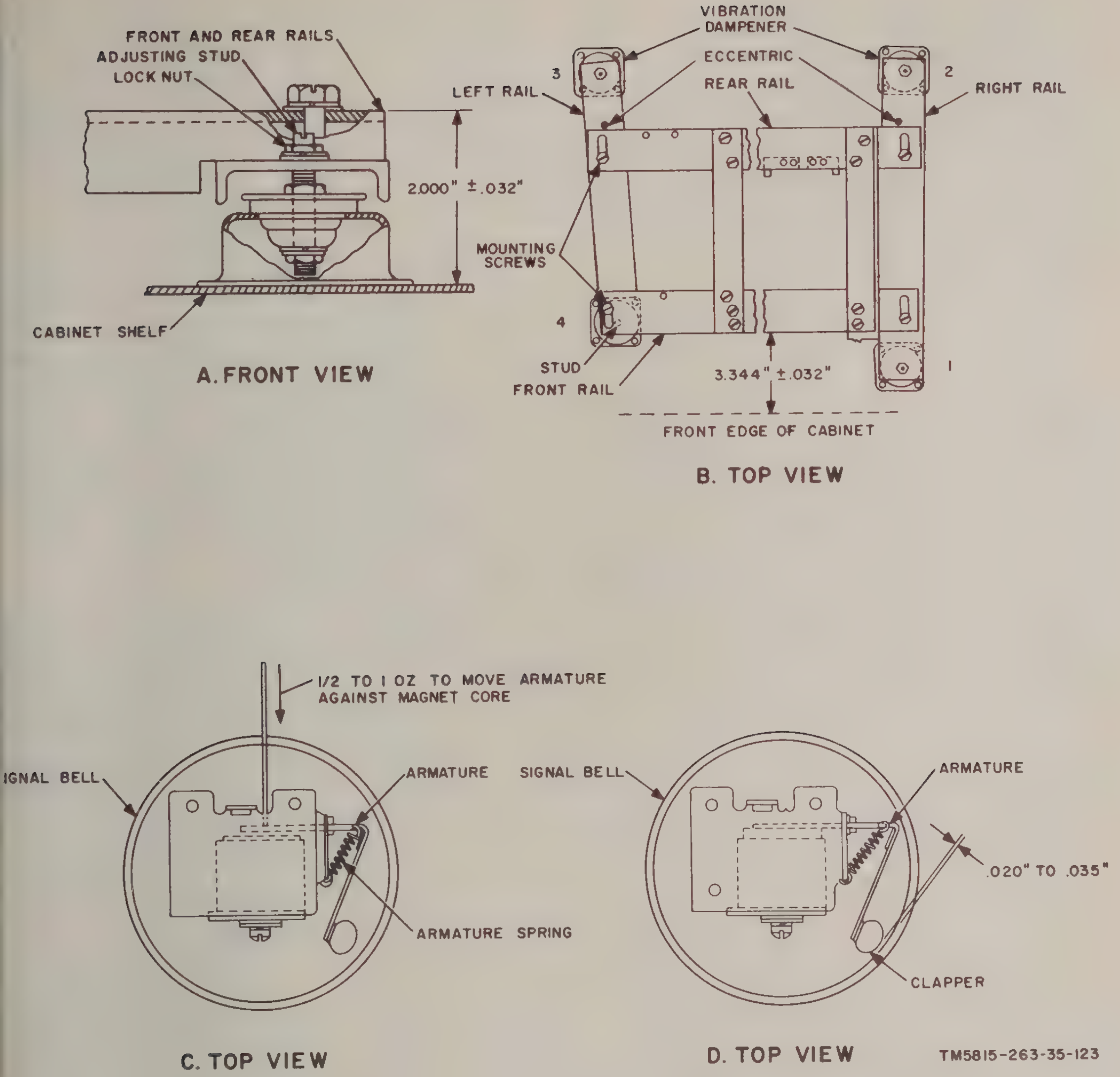

FRONT AND REAR RAILS
ADJUSTING STUD
LOCK NUT
2.000" ±.032"
CABINET SHELF
A. FRONT VIEW
VIBRATION DAMPENER
ECCENTRIC
REAR RAIL
LEFT RAIL
RIGHT RAIL
3
2
MOUNTING SCREWS
4
STUD
FRONT RAIL
3.344" ±.032"
1
FRONT EDGE OF CABINET
B. TOP VIEW
1/2 TO 1 OZ TO MOVE ARMATURE AGAINST MAGNET CORE
IGNAL BELL
ARMATURE
ARMATURE SPRING
C. TOP VIEW
SIGNAL BELL
ARMATURE
.020" TO .035"
CLAPPER
D. TOP VIEW
TM5815-263-35-123

Figure 368. Cradle assembly and signal bell.

32. Signal Bell Armature Spring Tension
(C, fig. 368)

a. Requirement. It should require a pressure f ½ to 1 ounce to move the armature against he magnet core.

b. Method of Checking. Remove the signal bell as instructed in paragraph 631*b*. Apply the push end of an 8 ounce scale perpendicular to the armature and push downward.

c. Adjustment. Replace the armature spring if it fails to meet the requirement. Replace the signal bell as instructed in paragraph 631*c*.

633. Purpose of Final Testing

Teletypewriter Sets AN/FGC–56 and AN/FGC–58 must be tested thoroughly to insure that they meet all performance requirements after they have been repaired. Use the tests described in this section to measure the performance of the repaired teletypewriter. The following chart lists the paragraphs containing information required for the final testing of the teletypewriter.

Item	Paragraph
Line Relay Test	635
Power Supply Test	636
Test Setup for General Performance Tests	637
General Performance Tests	638
Radio Interference Suppression Tests	639
Adjustment of Electrical Service Units	532
Troubleshooting	71
Adjustment of Typing Unit	236
Adjustment of Keyboard Base	468
Adjustment of Signal Contact Box	577
Adjustment of Transfer Bail Stabilizer	575
Adjustment of Perforator Unit	369
Adjustment of Reperforator Unit	581

634. Test Equipment Required for Final Testing

The test sets and applicable technical manuals required for final testing of the teletypewriter sets are listed below:

Item	Technical manual
Radio Interference Measuring Set AN/URM–3.	TM 11–5084
Test Set TS–2( )/TG	TM 11–2208
Distortion Test Set TS–383/GG	TM 11–2217
Multimeter AN/URM–105	TM 11–6625–203–12
Multirange Instrument Shunt MX–1471/U.	TM 11–6625–203–12
Test Set I–193–A, –B, –C	TM 11–2513

635. Line Relay Test

Test and adjust the line relay in accordance with TM 11–2513, Test Set I–193–A, –B, –C.

636. Power Supply Test

The power supply tests are conducted immediately before the power supply assembly is reinstalled into the main electrical service u (par. 172*d*) or the reperforator electrical se ice unit (par. 221*d*). The power supply m provide at least 115 volts dc at 150 ma (m electrical service unit) or 120 ma (reperfora electrical service unit) when operating with input voltage of 115 volts ± 10% at 60 cyc ±0.75%. Test the dc output as follows:

a. DC Voltage Test (fig. 369).

(1) Set the range selector on the Mu meter AN/URM–105 to the 1000 VOLT position. Connect the posit and negative probes of the meter the black and red leads, respective of the capacitor C1 or C4.

(2) Connect a stable 115 volt, 60 cy source to terminals 1 and 2 of transformer T2 or T3.

(3) The meter should indicate 1.15 on lower scale.

b. DC Current Test (fig. 369).

(1) Connect the Multirange Instrum Shunt MX–1471/U to the Multime AN/URM–105 for 0 to 1 ampere ran as directed in TM 11–6625–203–12.

(2) Connect one end of a 950 ohm, 25 w resistor to the red lead coming fr the capacitor C1 or C4. Connect t positive probe of the test set to t other end of the resistor and the ne tive probe to the black lead of t capacitor C1 or C4.

(3) Connect a stable 115-volt, 60 cy source to terminals 1 and 2 of t transformer T2 or T3.

(4) The meter should indicate 1.5 or on the lower scale.

(5) If the power supply fails to meet t requirements of either the voltage current tests, check for faulty co ponents as described in paragraph

637. Test Setup for General Performance Te (fig. 370)

The test connections described below a suitable for all tests of the teletypewriter s All switch settings required to obtain ea specific test condition are included in the par graphs describing the tests (pars. 638 and 63

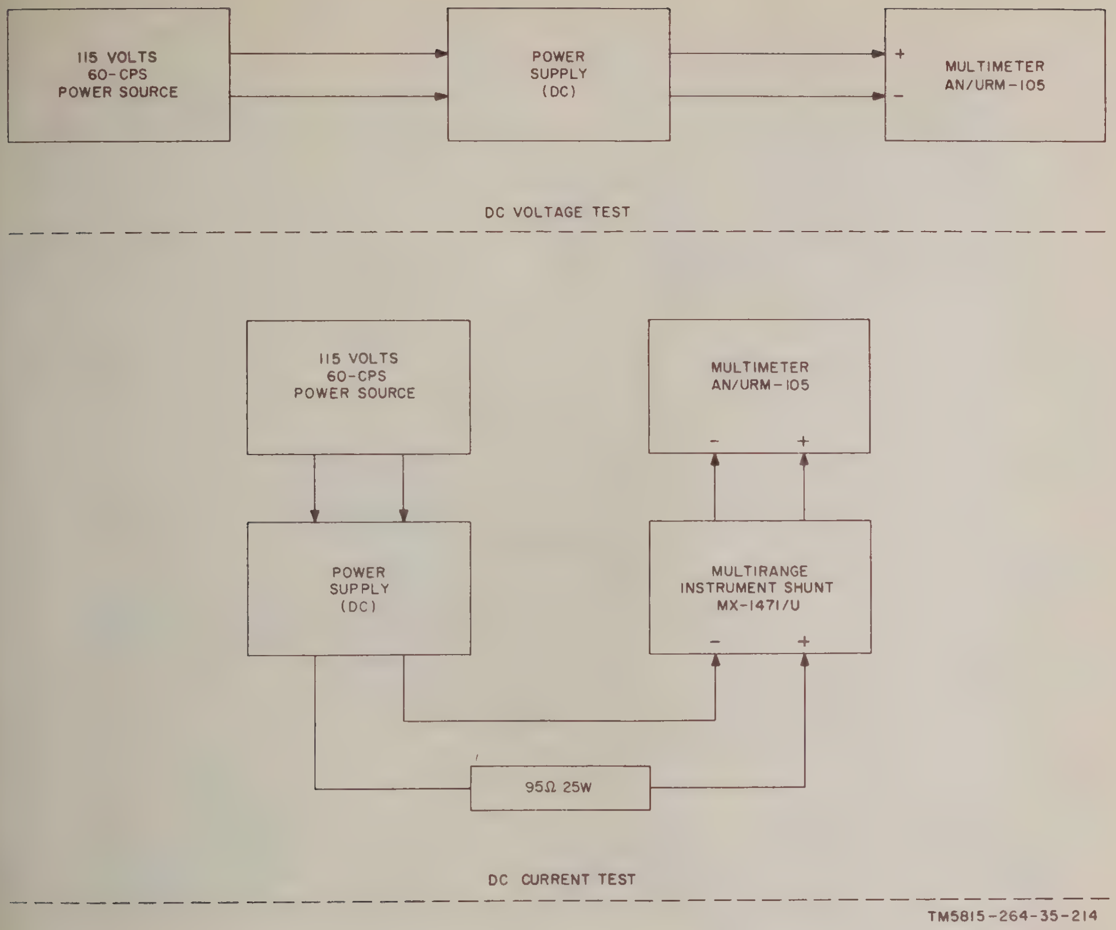

115 VOLTS 60-CPS POWER SOURCE
POWER SUPPLY (DC)
+
-
MULTIMETER AN/URM-105
DC VOLTAGE TEST
115 VOLTS 60-CPS POWER SOURCE
MULTIMETER AN/URM-105
- +
POWER SUPPLY (DC)
MULTIRANGE INSTRUMENT SHUNT MX-1471/U
- +
95Ω 25W
DC CURRENT TEST
TM5815-264-35-214

Figure 369. Power supply test setup.

a. The teletypewriter set should be in a complete reassembled state with no external signal line connection and with the bottoms of the electrical service units exposed for test connections. Place the power switches S3 and S17 in the OFF position, the line test switch S2 in the TEST position, and the keyboard control switch S4 in the KT position.

b. Connect the Signal Distortion Test Set TS–383/GG to the proper power sources as directed in TM 11–2217.

c. Connect the signal line cord of the test set to the external signal circuit of the teletypewriter set. Line battery should be supplied externally.

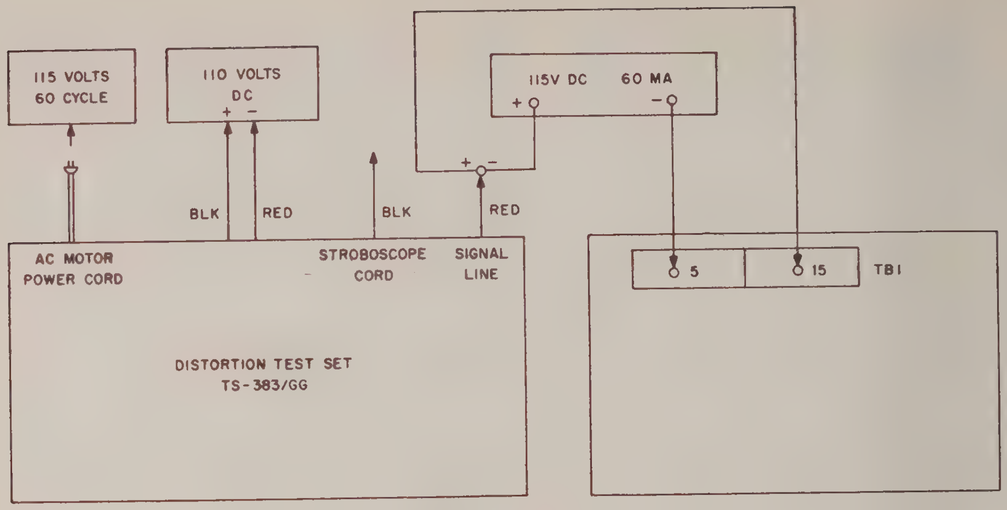
638. General Performance Tests

To make the general performance tests, proceed as follows:

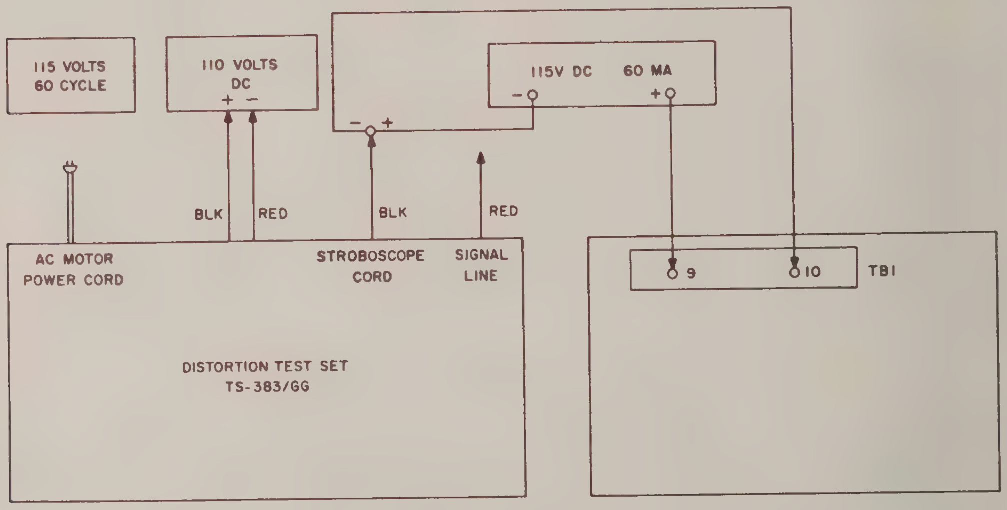
a. Bias Current Test (fig. 371). The bias current must be 30 ma for operation of typing unit in a 60-ma signal circuit, or 10 ma for operation in a 20-ma signal circuit. Test for bias current as follows:

(1) Connect the Multirange Instrument Shunt MX–1471/U to the Multimeter AN/URM–105 for 0 to 10 ma range as directed in TM 11–6625–203–12.

(2) For 60-ma signal circuit, disconnect the black electrical lead from terminal 1 on terminal board TB10 (main elec-


115 VOLTS
60 CYCLE
110 VOLTS
DC
+ −
115V DC
60 MA
+
−
+ −
BLK
RED
BLK
RED
AC MOTOR
POWER CORD
STROBOSCOPE
CORD
SIGNAL
LINE
5
15
TB1
DISTORTION TEST SET
TS-383/GG

GENERAL TEST SETUP


115 VOLTS
60 CYCLE
110 VOLTS
DC
+ −
115V DC
60 MA
−
+
− +
BLK
RED
BLK
RED
AC MOTOR
POWER CORD
STROBOSCOPE
CORD
SIGNAL
LINE
9
10
TB1
DISTORTION TEST SET
TS-383/GG

KEYBOARD TEST SETUP

TM5815-264-35-215

Figure 370. Test setup for general performance tests.

trical service unit) or TB22 (reperforator electrical service unit).

(3) Connect the positive probe of the test set to the free end of the electrical lead and the negative probe to terminal 1.

(4) Apply power to the teletypewriter set The meter should indicate 3 on th lower scale.

(5) For 20-ma signal circuit, the sam procedure is followed as above excep the black electrical lead is disconnecte

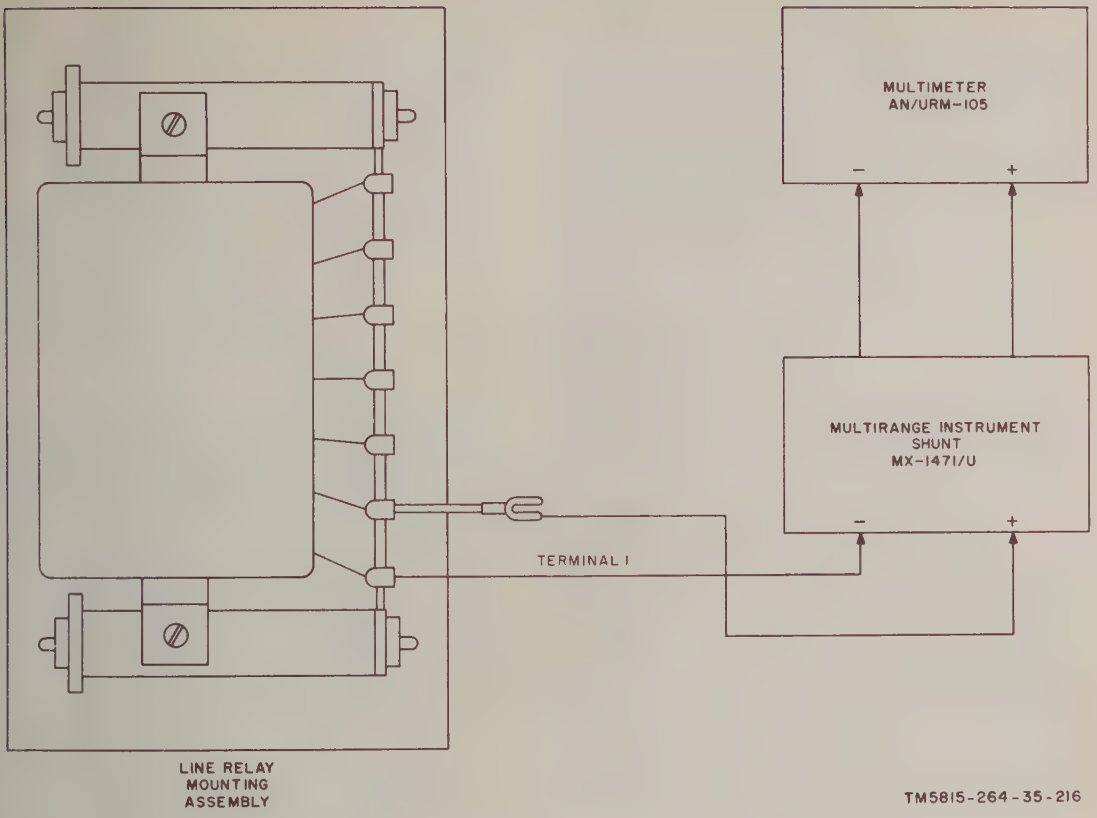


Figure 371. Bias current test setup (60-ma signal circuit).

from terminal 3 and the test set is connected between the lead and terminal 3 for a meter indication of 1 on the lower scale.

(6) Set all power switches to the OFF position; reconnect the electrical lead to its proper terminal on terminal board TB10 or TB22 and secure the electrical service unit chassis in the cabinet.

(7) If the requirements for the bias current test are not met, check for faulty components as described in paragraph 71.

b. Orientation Range Test (Zero Bias). The minimum orientation range of the selector mechanism must be 72 points with undistorted signals applied. Test for zero bias as follows:

(1) Place the control keys and knobs of TS-383/GG as follows:

Key or Switch	Position
MOTOR switch	ON
RUN-STOP switch	STOP
LINE-DIST. key	DIST.
VIEW-TRANSMIT key	VIEW
MARK-ZERO-SPACE key	ZERO
Code selecting switch	R

(2) With the above arrangement of keys and knobs, the stroboscope should indicate zero distortion of the signals, that is, the stroboscope lamp should light for 100 scale divisions of the graduated dial for each marking se-

lecting impulse and 142 scale divisions for the stop impulse. If necessary the graduated dial should be rotated to coincide with the respective impulses.

(3) Apply power to the teletypewriter, then rotate the RUN-STOP switch to the RUN position and the code selecting switch to the TEST MESSAGE position. Place the VIEW-TRANSMIT key in the TRANSMIT position and determine the limits of orientation as follows:

- (*a*) Turn the range finder knob towards the high end of the scale so that errors appear in the test message.
- (*b*) Then back-off the range finder knob to the point where only one error appears for two 72 character lines of the message. Note this setting as the high limit of range.
- (*c*) Turn the range finder knob towards the low end of the scale so that errors appear in the test message.
- (*d*) Then back-off the range finder knob to the point where only one error appears for two 72 character lines of the message. Note this setting as the low limit of range.
- (*e*) Determine zero bias as follows:

  Zero bias = (High limit of range) — (Low limit of range)

(4) If the selector mechanism fails to meet the requirement of the orientation range test, check the adjustments as described in paragraph 236.

c. Bias Tolerance Test. The maximum bias tolerance range of the selector mechanism must be 40 percent of distortion. Bias is a type of telegraph signal distortion which affects all impulses uniformly. It has the effect of advancing or delaying the beginning of each marking impulse with respect to the beginning of the character cycle. Measure the amount of bias the selector mechanism will withstand as follows:

(1) Place the keys and knobs in the following positions:

Key or Switch	Position
MOTOR switch	ON
LINE-DIST key	DIST
VIEW-TRANSMIT key	VIEW
BIAS-END DIST key	BIAS
Code selecting switch	R
RUN-STOP switch	STOP
MARK-ZERO-SPACE key	MARK

(2) Adjust the INCREASE DISTOR TION knob until the stroboscope in dicates that the marking selectin impulses each occupy 135 scale div sions. The signals will then be biase 35 percent.

Caution: **The INCREASE DIS TORTION knob should not be a justed when the disk is stationar because the distribution brushes wi be damaged.**

(3) Place the VIEW-TRANSMIT key i the TRANSMIT position, the code se lecting switch in the TEST MESS AGE position, and the RUN-STO switch in the RUN position. Dete mine the upper limit of the range c the selector mechanism with th marking bias applied, as follows:

- (*a*) Turn the range finder knob towarc the high end of the scale so tha errors appear in the test messag
- (*b*) Then back-off the range finder kno control to the point where only or error appears for two 72 characte lines of the message. Note this se ting as the low limit of range.

(4) Place the MARK-ZERO-SPACE ke in the SPACE position and determin the lower limit of the range whe spacing bias is applied as follows:

- (*a*) Turn the range finder knob toward the low end of scale so that error appear in the test message.
- (*b*) Then back-off the range finder kno control to the point where only on error appears for two 72 characte lines of the message. Note this se ting as the low limit of range.

(5) The maximum bias, in equal amount either marking or spacing, which th selector will withstand will be as fo lows:

$$\text{Maximum bias} = 35 + \frac{\begin{matrix}\text{Upper limit} \\ \text{marking bias}\end{matrix} - \begin{matrix}\text{Lower limit} \\ \text{spacing bias}\end{matrix}}{2}$$

Note. For maximum accuracy, the distortion introduced by the test set should be equal to the maximum distortion tolerance in the selector.

(6) If the selector mechanism fails to meet the requirement of the bias tolerance test, check the adjustments as described in paragraph 236.

d. Optimum Setting of the Range Finder for Biased Signals. The optimum orientation setting for bias is that point at which the selector will tolerate the maximum equal amounts of either marking or spacing bias. This point may be determined from the following:

$$\begin{matrix}\text{Optimum setting} \\ \text{for bias}\end{matrix} = \frac{\begin{matrix}\text{Upper limit} \\ \text{marking bias}\end{matrix} + \begin{matrix}\text{Lower limit} \\ \text{spacing bias}\end{matrix}}{2}$$

e. End Distortion Test. The maximum end distortion range of the selector mechanism must be 35 percent with distortion. End distortion is a special type of telegraph signal distortion created for testing purposes. It affects all impulses uniformly except for the stop and start impulses. It has the effect of advancing or delaying the end of each marking selecting impulse with respect to the beginning of the character cycle. Measure the amount of end distortion the selector mechanism will withstand as follows:

(1) Place the keys and knobs as instructed in *b*(1) above, then set the Bias-End Dist. Key to the END DIST. position and the Mark-Zero-Space Key to the SPACE position.

(2) Adjust the INCREASE DISTORTION knob until the stroboscope indicates that the marking selecting impulses each occupy 65 scale divisions.. The signal will then have 35 percent spacing end distortion.

(3) Place the VIEW-TRANSMIT key in the TRANSMIT position, the CODE SELECTING switch in the TEST MESSAGE position, and the RUN-STOP switch in the RUN position. Determine the upper limit of the range with the 35 percent end distortion applied as in *c*(3)(*a*) and (*b*) above.

(4) Place the MARK-ZERO-SPACE key in the MARK position and determine the low limit of the range with 35 percent marking end distortion applied as in *c*(4)(*a*) and (*b*) above.

(5) The maximum end distortion in equal amounts, either marking or spacing, which the selector can withstand will be as follows:

$$\begin{matrix}\text{Maximum end} \\ \text{distortion}\end{matrix} = 35 + \frac{\begin{matrix}\text{Upper limit} \\ \text{spacing end} \\ \text{distortion}\end{matrix} - \begin{matrix}\text{Lower limit} \\ \text{marking end} \\ \text{distortion}\end{matrix}}{2}$$

(6) If the selector mechanism fails to meet the requirement of the end distortion test, check the adjustments as described in paragraph 236.

f. Optimum Setting of the Range Finder for End Distortion. The optimum orientation setting for end distortion is that point at which the selector will tolerate maximum equal amounts of either marking or spacing end distortion. This point may be determined from the following:

$$\begin{matrix}\text{Optimum setting for} \\ \text{end distortion}\end{matrix} = \frac{\begin{matrix}\text{Upper limit} \\ \text{spacing end} \\ \text{distortion}\end{matrix} + \begin{matrix}\text{Lower limit} \\ \text{marking end} \\ \text{distortion}\end{matrix}}{2}$$

g. Internal Bias Test. Internal bias of a receiving unit is a computed measurement of the effect of maladjustment, wear, or some other mechanical fault within the mechanism. It is used as a measure of the efficiency of the receiving unit. The internal bias may be calculated by subtracting the Optimum Setting for Bias (*d* above) from the optimum setting for end distortion (*f* above). If the difference between the two settings exceeds six points, some mechanical fault is present.

h. Keyboard Test (fig. 370). The distortion in signals transmitted from the keyboard should not exceed five percent. Use the Distortion Test Set TS–383/GG to measure the distortion as described in (1) below. If a distortion measuring set is not available, use the range comparison test, (2) below.

(1) Test with TS–383/GG as follows:

(*a*) Disconnect the signal line cord of the test set from the teletypewriter.

(*b*) Connect a 115-volt, dc, 60-ma power source in series to the stroboscope cord between terminals 9 (+) and 10 (—) on terminal board TB1.

(*c*) Adjust the test set for zero distortion signal indication as instructed in *b*(1) and (2) above, then place the keys and controls as follows:

Key or Switch	Position
RUN-STOP switch	RUN
LINE-DIST key	LINE
BIAS-END DIST key	NEUTRAL
VIEW-TRANSMIT key	TRANSMIT
Stop-Pulse switch	ON

(*d*) Hold the selector magnets closed by use of an armature clip, part number 152292, to keep the machine running closed.

(*e*) Apply power to the teletypewriter and test each contact individually by sending repeated E, LINE FEED, SPACE, CAR RET and T combination from the keyboard. Send the repeated signal combinations by holding down the desired key and the REPT key for observation on the stroboscope.

(*f*) Any deviation from 100 percent impulse length would be caused maladjustment of the respecti pair of contacts. Refer to par graph 468 for adjustments of t keyboard.

(*g*) Upon successful completion of t test, restore the teletypewriter to normal operating condition.

(2) The range comparison test requir the use of a receiving unit known be in good condition and a source undistorted signals. If both are ava able, test the quality of signals tran mitted from the keyboard as follow

(*a*) If the receiving unit of the tel typewriter under test meets t requirements of the general pe formance tests (*a* through *g* above arrange the teletypewriter to ope ate in a normal receive conditio Connect the signal circuit of eith Test Set TS–2( )/TG or a proper adjusted tape transmitter to term nals 5 and 15 of terminal boa TB1.

(*b*) Apply power to the teletypewrit and arrange the test set to supp zero distortion signals as describ in TM 11–2208. If a tape transmi ter is used, arrange it to transm test signals with a test tape.

(*c*) Make a range test of the receivi unit, as in *b*(3) above, while opera ing with undistorted signals fro the TS–2( )/TG or the tape tran mitter.

(*d*) Make a range test as in (*c*) abo using signals from the keyboa transmitter.

(*e*) If the range obtained in (*c*) abo exceeds the range obtained in (*c* above by more than 10 points, t distortion in the signals transmitt from the keyboard is excessive. A just the keyboard as described paragraph 468 until the range di ference is 10 points or less.

(*f*) Upon successful completion of t test, restore the teletypewriter to normal operating condition.

. *Transmitter Distributor Test* (fig. 372). e accuracy of the signals generated by the nsmitter distributor shall be within plus or nus five percent of their ideal length relative the end of the stop pulse. Use the Distortion st Set TS–383/GG to measure the distortion signals as described in (1) below. If a test is not available, use the range comparison t, (2) below.

(1) Test with TS–383/GG as follows:

(*a*) Disconnect the signal line cord of the test set from the teletypewriter set.

(*b*) Connect a 115-volt, dc, 60-ma power source in series to the stroboscope cord between terminals 129 (+) and 130 (—) on terminal board TB3.

(*c*) The signal generator will be synchronized with the test set so that the end of the stop pulse image is in line with the 142 mark on the test set scale when transmission is continuous and both units are operating at the same speed.

Note. The end of the stop pulse image shall not vary more than ½ division from the 142 mark. If a greater variation occurs, move the scale until the variation is of the same amount on either side of the 142 mark. The dc power filter Z7 should be disconnected when the signal is being checked.

(*d*) The light image of individual marking pulses must meet the following requirements for speeds up to and including 100 WPM:

1. Each marking code pulse should start no later than the 5th mark of the pulse under observation and start no earlier than the 95th mark of the previous pulse.

2. Each marking code pulse should end no earlier than the 95th mark of the pulse under observation and end no later than the 5th mark of the following pulse.

3. Each marking code pulse may have one break provided the break is not over one division wide and provided the break occurs only at the end of the code pulse image between the 95th mark and the end of the image.

4. The stop pulse should start no earlier than the 95th mark of the 5th pulse and start no later than the 5th mark of the stop position.

(*e*) Any deviation from the above requirements can be corrected by loosening the two contact box mounting screws until they are just friction tight; then rotate the eccentric towards the right or left until the above requirements have been obtained. Tighten the mounting screws and recheck.

Note. If the above requirements can not be met, refine the signal contact box adjustment (par. 577) and the transfer bail stabilizer adjustment (par. 575) with the signal viewed on the signal distortion test set.

(*f*) Upon successful completion of the test, restore the equipment to a normal operating condition.

(2) The range comparison test requires the use of a receiving unit known to be in good condition and the transmitter distributor to be tested. Test the quality of signals transmitted from the signal contact box as follows:

(*a*) If the receiving unit of the teletypewriter under test meets the requirements of the general performance tests (*a–g* above), arrange the teletypewriter set to receive signals from the transmitter distributor.

(*b*) Insert an RY test tape in the transmitter distributor and let the equipment operate for 10 minutes.

(*c*) Check the range on the range finder scale of the typing unit. There should be satisfactory performance when the range settings are between 10 and 90 on the scale. If the performance is not satisfactory, check the adjustments as in (1)(*e*) above. Let the equipment operate for 10 minutes and again check the range. There should be correct transmission in the 10 to 90 range.

(*d*) Upon successful completion of the test, restore the equipment to a normal operating condition.

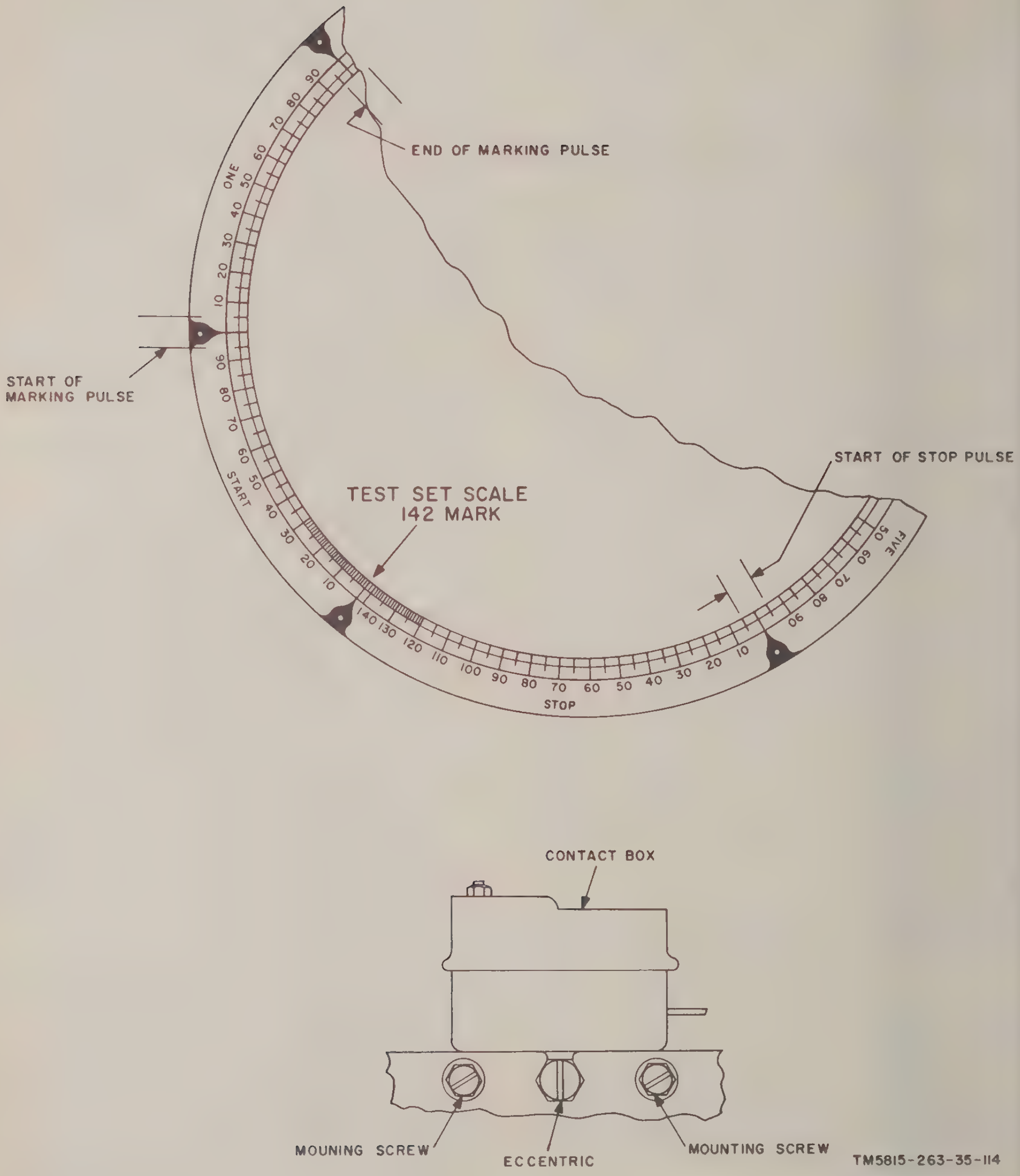

END OF MARKING PULSE
ONE
START OF
MARKING PULSE
START
TEST SET SCALE
142 MARK
START OF STOP PULSE
FIVE
STOP
CONTACT BOX
MOUNING SCREW
ECCENTRIC
MOUNTING SCREW
TM5815-263-35-114

Figure 372. Transmitter distributor signal pulse test.

j. Perforator Test. The mechanical accuracy f the perforator must be such that no incorrect haracters in any 5,000 consecutive characters vill be printed or perforated as a result of some nechanical fault in the mechanism.

(1) The test for the perforator consists of exercising the mechanism from the keyboard at a rate of 900 OPM (150 WPM) for a 2-hour period. No errors in the perforated and printed tape will be permitted which are a result of malfunctioning of the perforator.

(2) If the perforator mechanism fails to meet the requirements of the test above, check the applicable adjustments as described in paragraph 369.

k. Reperforator Test. The tests for the reperforator unit are essentially the same as given n *a* through *g* above. The differences are in he test connections for the test equipment used nd are noted in the applicable places. Connect he Signal Distortion Test Set TS–383/GG to erminals 1 (+) and 2 (—) of terminal board TB24. If the selector mechanism for the reperforator unit fails to meet the requirements f *b* through *g* above, check the applicable adjustments as described in paragraph 581.

539. Radio Interference Suppression Tests

The teletypewriter set must not cause radio nterference in excess of the limits specified in *a* and *b* below. Unless properly filtered and hielded, operation of the teletypewriter set will ause both radiated and conducted interference rom the motor, transmitting contacts, and relay contacts. Test for radiated and conducted nterference as follows:

a. Radiated Interference.

(1) *Limits.* When the teletypewriter set is operating 3 feet away from the radio interference measuring set, the interference must not exceed .25 microvolt per megacycle over a frequency range from .15 megacycle to 400 megacyles.

(2) *Test arrangement.* The teletypewriter set should be set up and operated in a normal manner. The rear of the test set should be facing the front of the teletypewriter. Set up the test set and test set antenna for radiated noise test as instructed in TM11–5084.

(3) *Test procedures.* Test measurement procedures are as follows:

(*a*) Plug the headset into the PHONES jack and set the POWER and PLATE switches to ON.

(*b*) Set the FREQUENCY RANGE control to .15 to .4 mc. Vary the TUNING control until a signal is heard, then set the PULSE switch to ON.

(*c*) Set the OUTPUT db COARSE and SENSITIVITY controls to obtain a weak noise signal and adjust the ANTENNA TRIMMER control for maximum output. Adjustment of the trimmer is not required on frequency ranges .15 to .4 mc and 1.6 to 3.0 mc, because this control is not in the circuit on these two ranges.

(*d*) Turn the PULSE switch to OFF and adjust the SENSITIVITY control until the interference being measured is heard at a low level in the headset.

(*e*) Adjust the SLIDEBACK control clockwise until the noise is not heard, then adjust back to the point where the noise can just be heard. Shut off the teletypewriter.

Note. Do not disturb the controls on the test set until the test has been completed.

(*f*) Set the Pulse Switch to ON and adjust the REPETITION RATE control to approximately the same repetition rate or pitch that was heard from the interference being measured.

(*g*) Set the OUTPUT db FINE and the OUTPUT db COARSE controls to a combination which will produce the weakest noise signal. Rotate the OUTPUT db FINE control counterclockwise until the noise signal disappears, then back (usually 1 db) to the point where the noise can just be heard.

(*h*) To get the noise value, use the following procedure:

1. Add the db settings of the OUTPUT db COARSE and OUTPUT db FINE controls.

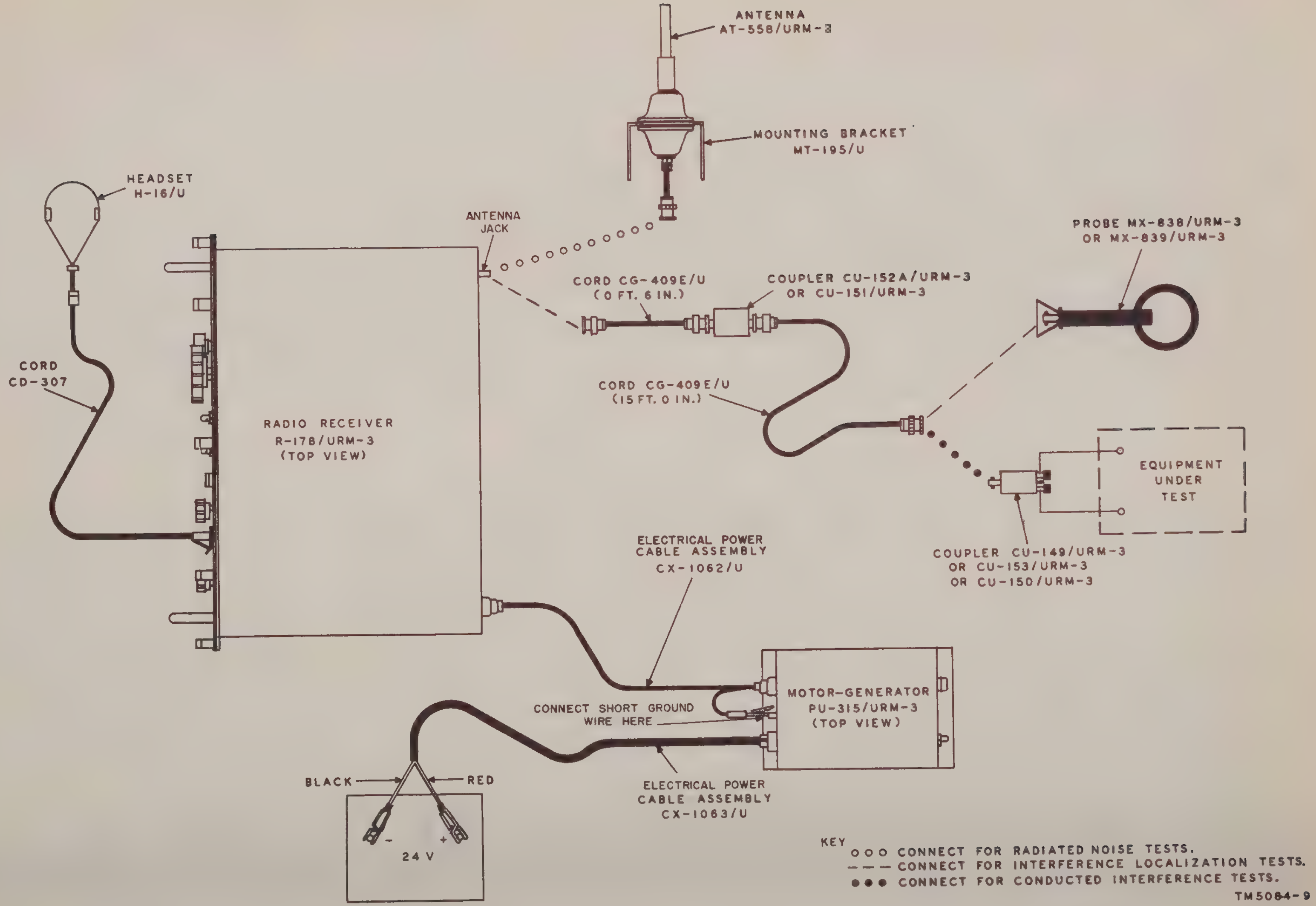

ANTENNA
AT-558/URM-3
MOUNTING BRACKET
MT-195/U
HEADSET
H-16/U
ANTENNA
JACK
PROBE MX-838/URM-3
OR MX-839/URM-3
CORD CG-409E/U
(0 FT. 6 IN.)
COUPLER CU-152A/URM-3
OR CU-151/URM-3
CORD
CD-307
RADIO RECEIVER
R-178/URM-3
(TOP VIEW)
CORD CG-409E/U
(15 FT. 0 IN.)
EQUIPMENT
UNDER
TEST
ELECTRICAL POWER
CABLE ASSEMBLY
CX-1062/U
COUPLER CU-149/URM-3
OR CU-153/URM-3
OR CU-150/URM-3
MOTOR-GENERATOR
PU-315/URM-3
(TOP VIEW)
CONNECT SHORT GROUND
WIRE HERE
BLACK
RED
ELECTRICAL POWER
CABLE ASSEMBLY
CX-1063/U
-
+
24 V
KEY
○○○ CONNECT FOR RADIATED NOISE TESTS.
— — — CONNECT FOR INTERFERENCE LOCALIZATION TESTS.
●●● CONNECT FOR CONDUCTED INTERFERENCE TESTS.
TM5084-9

Figure 373. Radio Interference Measuring Set AN/URM-3, cording diagram.

2. Subtract the frequency conversion factor obtained from the following chart and convert to uv/mc as instructed.

3. Convert to uv/mc as given below:

Total db to microvolts per mc

Frequency Correction: Before conversion subtract from total db as follows:

15 mc through 16 mc—0 db
17 mc through 28 mc—1 db
29 mc through 34 mc—2 db
35 mc through 42 mc—3 db

1. Subtract highest possible multiple of 20 from the the corrected total db.
2. Use the 0–20 db to uv/mc chart below to convert.
3. Move the decimal point one place to the right for each 20 db subtracted.

Example: Total db settings of output controls at 30 mc. = 58 db
Less correction factor of 2 db = 56 db
Less highest multiple of 20 (40) = 16 db
16 db on chart (below) = 6.31 uv/mc
Move decimal point one place to the right for each 20 db subtracted (2 places) = 631. uv/mc

db	uv/mc	db	uv/mc
0	1.00	11	3.55
1	1.12	12	3.98
2	1.26	13	4.47
3	1.41	14	5.01
4	1.59	15	5.62
5	1.78	16	6.31
6	2.00	17	7.08
7	2.24	18	7.94
8	2.51	19	8.91
9	2.82	20	10.00
10	3.16		

(*i*) Repeat the procedure outlined in (*b*) through (*h*) above at each of the remaining FREQUENCY RANGE control settings.

(4) *Corrective measures.* Check all noise suppressing elements for proper installation and operation. Check ground and cable connections, relay contacts, shields, and terminal connections for looseness, corrosion, or pitted surfaces.

b. Conducted Interference.

(1) *Limits.* The maximum level of interference between each terminal and ground of all electrical connections from the teletypewriter set is 10 microvolts per megacycle over a frequency range of 1.5 megacycles to 40 megacycles.

(2) *Test arrangement.* Conduction interference tests can be performed in most locations except where extremely heavy interference from electrical machinery, arc welders, etc., is present. The test is performed on the signal line connections and then the power line connections, in turn. The test set is set up for conduction noise test as instructed in TM 11–5984. If a jack panel is available, the short direct leads from Coupler CU–153/URM–3 (fig. 373) are connected directly across the signal line going to the teletypewriter set under test. If the jack panel is not available, it will be necessary to connect the test leads into the input side of the signal line suppressor Z1. The same conditions hold true for the power line connections. The teletypewriter set should be in a normal operating condition after the test connections have been made. Connect the cables and couplers as follows:

(*a*) Connect Cord CG–409E/U to the antenna connector at the rear of the test set and connect the REC end of Coupler CU–152A/URM–3 to the other end of the cord.

(*b*) Connect Cord CG–409E/U to the Coupler CU–152A/URM–3 and Coupler CU–153/URM–3 to the cord.

(*c*) Using short direct leads, connect the binding posts of the coupler directly across the signal line input in front of the signal line suppressor Z1 and conduct the test procedures. Reconnect the binding posts of the coupler directly across the power input in front of the power line suppressor Z2.

***Caution:* Observe proper ground connections to prevent damage to the test equipment.**

(3) *Test procedures.* Test measurement procedures are as follows:

(*a*) Set the FREQUENCY RANGE control to .15 to .4 mc. Rotate the TUNING control to a point where noise signals are not heard.

(*b*) Set the PULSE switch to ON. Set the OUTPUT db FINE, OUTPUT db COARSE, and SENSITIVITY controls to obtain a weak noise signal in the headset; adjust the ANTENNA TRIMMER control for maximum output.

(*c*) Turn the PULSE switch to OFF and turn the teletypewriter ON.

(*d*) Adjust the SENSITIVITY control to a position where the noise being measured is heard at a low level in the headset. (Note the approximate pitch of the noise.)

(*e*) Adjust the SLIDEBACK control clockwise to the point where the noise is not heard, then back to the point where it can just be heard. Stop operation of the teletypewriter and shut off the power.

Note. Do not disturb the controls on the test set until the test is completed.

(*f*) Set the PULSE switch to ON and adjust the REPETITION RATE control to the rate (pitch) of the noise under test.

(*g*) Set the OUTPUT db FINE and OUTPUT db COARSE controls to a combination that produces the weakest noise in the headset.

(*h*) Rotate the OUTPUT db FINE control counterclockwise until the noise signal disappears, then back to where it is barely heard.

(*i*) To get the noise value, use the same procedures as in *a*(3) (*h*) above except add 24db to the total of the OUTPUT db FINE and OUTPUT db COARSE control settings.

(*j*) Repeat the procedure outlined in (*b*) through (*i*) above at each of the remaining FREQUENCY RANGE control settings.

(4) *Corrective measures.* Check all noise suppressing elements for proper installation and operation. Check ground and cable connections, relay contacts, shields, and terminal connections for looseness, corrosion, or pitted surfaces.

CHAPTER 4
THEORY

Section I. GENERAL THEORY OF TELETYPEWRITER SETS AN/FGC–56 AND AN/FGC–58

640. Teletypewriter Sets, Block Diagram (fig. 374)

a. Teletypewriter Set AN/FGC–56 contains two sending units (keyboard signal generator and transmitter distributor), and one receiving unit (typing unit). The sending units translate the mechanical positions of various cams and levers, as initiated from the keyboard (signal generator) or sensed as tape perforations (transmitter distributor) into groups of electrical impulses corresponding to the teletypewriter signaling code (par. 641). These impulses are sent through a connecting signal line to receiving units. The receiving units are controlled by the electrical impulses in such a way that the above (send) process is reversed, thus translating the impulse groups to related mechanical movements to produce a printed message. In addition to the sending and receiving units described above, the set is equipped with a perforator which provides a means of producing a perforated (and printed) tape for future transmission. The transmitting and receiving components can operate on either 20 or 60 milliampere neutral signals at speeds of 368, 460, or 600 operations per minute (60, 75, or 100 words per minute, respectively). The standard five-level, 7.42-unit, start-stop code is used. The mechanical power required to operate the various parts and mechanisms is provided by an ac synchronous motor.

b. Teletypewriter Set AN/FGC–58 is equipped with the same components that are provided in the AN/FGC–56 (*a* above), but differs from that set in that it contains an additional receiving unit (reperforator). This device translates electrical impulse groups, sent to it from a signal line, to related mechanical movements which result in the production of a typewritten and perforated tape. The reperforator of the AN/FGC–58 has the same operational capabilities (signal, speed, code, etc.) as the units described in *a* above. Mechanical power for the reperforator is supplied by its own motor unit so that it is, in effect an auxiliary unit to the remainder of the set.

641. Signaling Code

The signaling code used in teletypewriter communications systems operating on a neutral basis, consists of a sequence of current (marking) and no-current (spacing) selecting impulses. Each code group consists of five impulses which may be marking or spacing, depending on the character or function transmitted. Each group of five selecting impulses is preceded by a start impulse(always a spacing impulse) and is followed by a stop impulse (always a marking impulse). These start and stop impulses provide the means for maintaining synchronism between the sending and receiving teletypewriter mechanisms. When the five impulses are arranged in all possible combinations, they provide 32 different code groups. With the addition of the upper case (figures) a unit is capable of performing twice as many operations as the number of available code combinations. Figure 375 illustrates the relationship between the code impulses and keyboard symbols, typed characters, tape perforations, and unit functions.

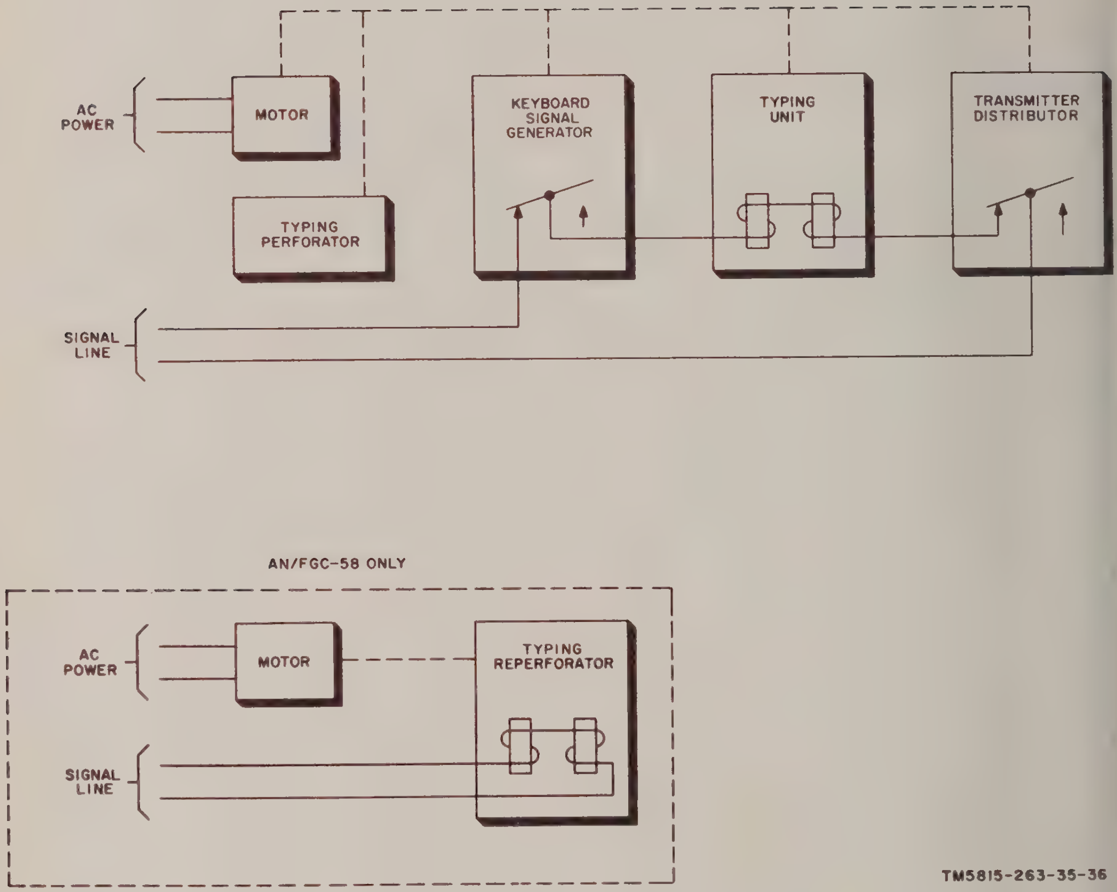
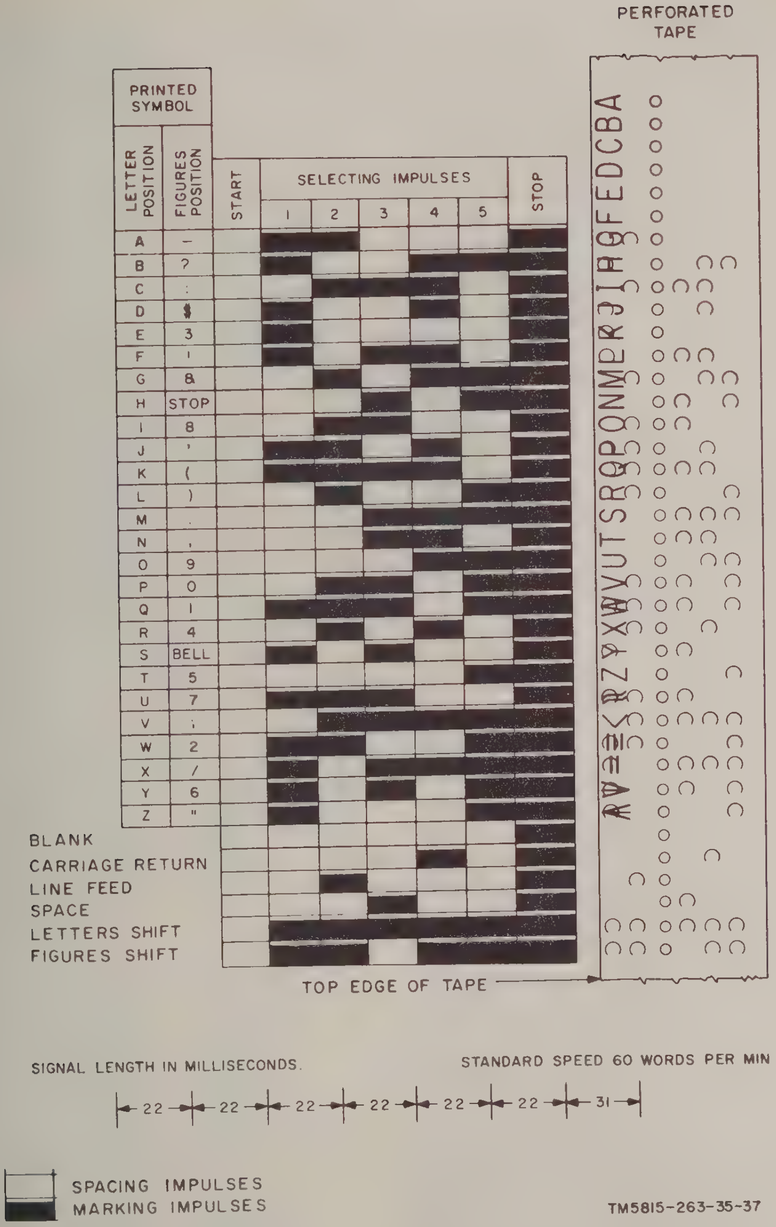

AC POWER
MOTOR
TYPING PERFORATOR
KEYBOARD SIGNAL GENERATOR
TYPING UNIT
TRANSMITTER DISTRIBUTOR
SIGNAL LINE
AN/FGC-58 ONLY
AC POWER
MOTOR
TYPING REPERFORATOR
SIGNAL LINE
TM5815-263-35-36

Figure 374. Teletypewriter sets, block diagram.


PERFORATED TAPE
TOP EDGE OF TAPE
SIGNAL LENGTH IN MILLISECONDS.
STANDARD SPEED 60 WORDS PER MIN
22
22
22
22
22
22
31
TM5815-263-35-37

PRINTED SYMBOL		START	SELECTING IMPULSES					STOP
LETTER POSITION	FIGURES POSITION		1	2	3	4	5	
A	–	□	■	■	□	□	□	■
B	?	□	■	□	□	■	■	■
C	:	□	□	■	■	■	□	■
D	$	□	■	□	□	■	□	■
E	3	□	■	□	□	□	□	■
F	!	□	■	□	■	■	□	■
G	&	□	□	■	□	■	■	■
H	STOP	□	□	□	■	□	■	■
I	8	□	□	■	■	□	□	■
J	'	□	■	■	□	■	□	■
K	(	□	■	■	■	■	□	■
L	)	□	□	■	□	□	■	■
M	.	□	□	□	■	■	■	■
N	,	□	□	□	■	■	□	■
O	9	□	□	□	□	■	■	■
P	0	□	□	■	■	□	■	■
Q	1	□	■	■	■	□	■	■
R	4	□	□	■	□	■	□	■
S	BELL	□	■	□	■	□	□	■
T	5	□	□	□	□	□	■	■
U	7	□	■	■	■	□	□	■
V	;	□	□	■	■	■	■	■
W	2	□	■	■	□	□	■	■
X	/	□	■	□	■	■	■	■
Y	6	□	■	□	■	□	■	■
Z	"	□	■	□	□	□	■	■
BLANK		□	□	□	□	□	□	■
CARRIAGE RETURN		□	□	□	□	■	□	■
LINE FEED		□	□	■	□	□	□	■
SPACE		□	□	□	■	□	□	■
LETTERS SHIFT		□	■	■	■	■	■	■
FIGURES SHIFT		□	■	■	□	■	■	■

□ SPACING IMPULSES
■ MARKING IMPULSES

Figure 375. Signaling code chart.

642. Block Diagram of Teletypewriter Set AN/FGC-56

(fig. 376)

The block diagram presents the various components as operating stages or functional groups of parts to aid in simplifying the descriptions given below. Since various modes or types of operation can be employed in this equipment, the subparagraphs below describe the operation of individual components of the set under the paragraph heading (sending, receiving) in which they apply. Refer to paragraphs 10 and 17 of TM 11-5815-263-12 for the types of operation that can be provided by the equipment and the switch settings that must be made to obtain a given type of operation.

a. Receiving. The receiving function in Teletypewriter Set AN/FGC-56 is accomplished by the typing unit in all types of operation (whether the transmitting function is being performed by the keyboard or the transmitter distributor). The typing unit receives dc start-stop (mark and space) impulses, sent from the keyboard, signal generator, transmitter distributor, or signal line, through the line relay into the selector mechanism. The selector mechanism converts the electrical impulses to a series of mechanical movements which result in an arrangement of parts that correspond to the code group received. This mechanical setting is transferred to the code bar mechanism which then sets up the character to be printed or the function to be performed. The typing unit main shaft and the keyboard intermediate shaft assemblies are driven by the main motor unit and provide the mechanical or motive power required to perform the operation thus selected by the code bar mechanism.

b. Sending. Transmission of messages can be initiated at either of two control points (keyboard or transmitter distributor) as selected by the keyboard control which provides control of the keyboard-perforator mechanical linkage and the keyboard control switch S4. In the K (keyboard) position, the keyboard control disconnects the code bar extensions from the keyboard code bar mechanism and connects the code bar mechanism to the keyboard signa generator while disconnecting ac power (by means of the control switch) from the transmitter distributor. In the K-T (keyboard-tape) position, the keyboard control connects the code bar extensions and keyboard signal generator to the code bar mechanism and ac power is applied to the transmitter distributor. In the T (tape) position, the keyboard control disconnects the keyboard signal generator from the code bar mechanism while leaving the code bar extensions connected and applying ac power to the transmitter distributor clutch trip magnet E8, E9.

(1) *Keyboard sending.* Depressing a keylever positions a train of parts within the keyboard code bar mechanism and also causes the keyboard intermediate shaft to begin operation of the signal generator mechanism. This positioning of parts together with the motion of the intermediate shaft causes the keyboard signal generator contacts to open and close to produce electrical impulses corresponding to the five-unit code. These impulses are then passed to the signal line.

(2) *Transmitter distributor sending.* Before the sequence of operations is started, it must be noted that the keyboard control has been placed in the correct position for tape sending (K-T or T), a perforated tape has been loaded into the transmitter distributor with the tape lid closed, and the manual control lever is in the STOP position. Placing the manual control lever to the RUN position closes the ac circuit to the clutch trip magnet E8, E9 to cause the cam clutch assembly to begin rotating. The cam clutch assembly, in turn, imparts motion to the tape feed and tape sensing mechanisms. The tape feed mechanism advances the tape to a set of perforations, and the sensing fingers of the tape sensing mechanism are released to contact the tape (and will extend through the tape where

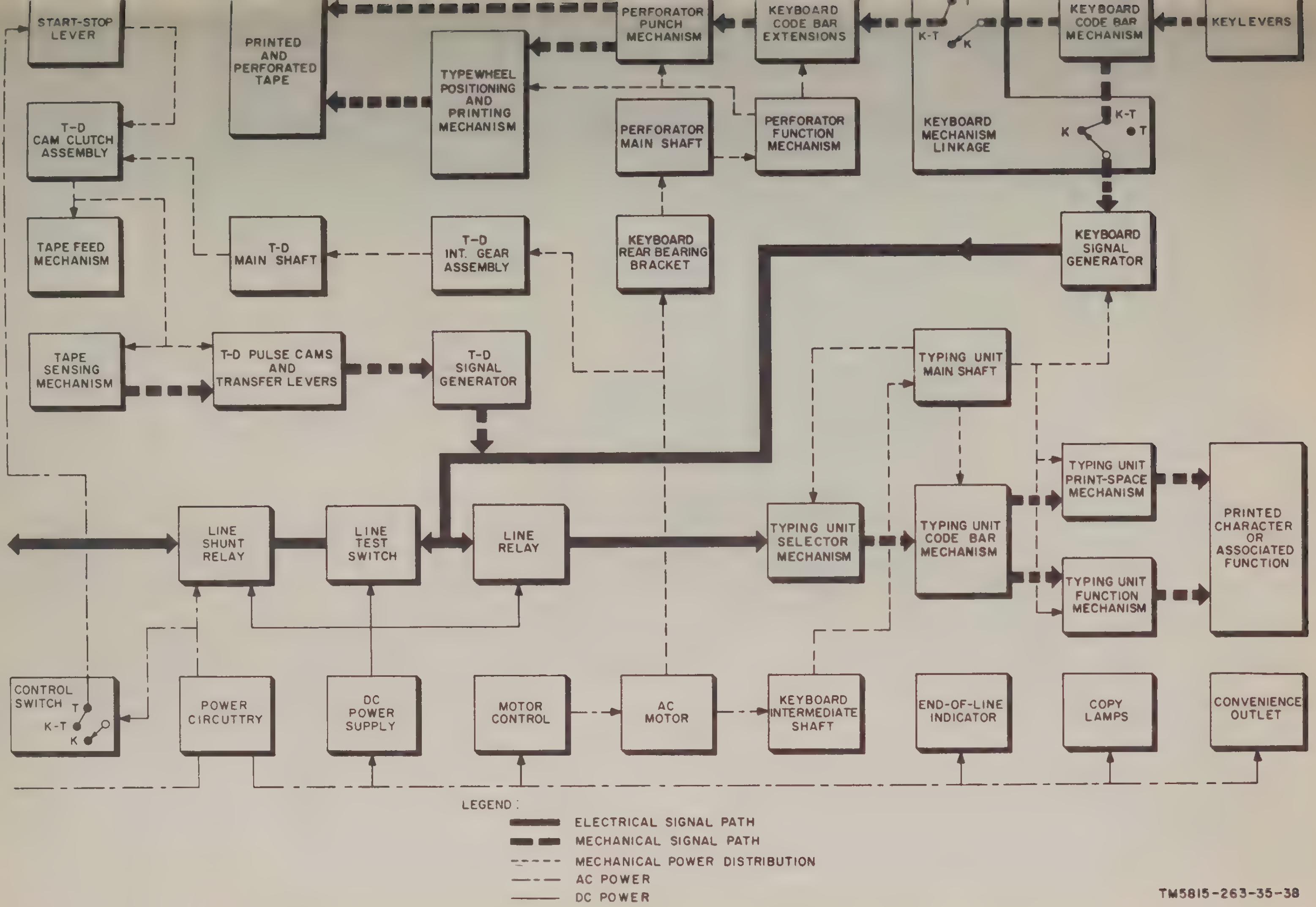

START-STOP LEVER
PRINTED AND PERFORATED TAPE
TYPEWHEEL POSITIONING AND PRINTING MECHANISM
PERFORATOR PUNCH MECHANISM
KEYBOARD CODE BAR EXTENSIONS
K-T
K
KEYBOARD CODE BAR MECHANISM
KEYLEVERS
T-D CAM CLUTCH ASSEMBLY
PERFORATOR MAIN SHAFT
PERFORATOR FUNCTION MECHANISM
KEYBOARD MECHANISM LINKAGE
K-T
K
T
TAPE FEED MECHANISM
T-D MAIN SHAFT
T-D INT. GEAR ASSEMBLY
KEYBOARD REAR BEARING BRACKET
KEYBOARD SIGNAL GENERATOR
TAPE SENSING MECHANISM
T-D PULSE CAMS AND TRANSFER LEVERS
T-D SIGNAL GENERATOR
TYPING UNIT MAIN SHAFT
TYPING UNIT PRINT-SPACE MECHANISM
PRINTED CHARACTER OR ASSOCIATED FUNCTION
LINE SHUNT RELAY
LINE TEST SWITCH
LINE RELAY
TYPING UNIT SELECTOR MECHANISM
TYPING UNIT CODE BAR MECHANISM
TYPING UNIT FUNCTION MECHANISM
CONTROL SWITCH
T
K-T
K
POWER CIRCUTTRY
DC POWER SUPPLY
MOTOR CONTROL
AC MOTOR
KEYBOARD INTERMEDIATE SHAFT
END-OF-LINE INDICATOR
COPY LAMPS
CONVENIENCE OUTLET
LEGEND:
ELECTRICAL SIGNAL PATH
MECHANICAL SIGNAL PATH
MECHANICAL POWER DISTRIBUTION
AC POWER
DC POWER
TM5815-263-35-38

Figure 376. Teletypewriter set, functional block diagram.

perforations are contained). The positioning of the sensing fingers is passed, through the action of the transfer levers and cams to the signal generator. The signal generator contacts are caused to open and close, according to the character sensed, to produce the impulses corresponding to the five-unit code. These impulses are then sent to the signal line. Rotary motion to the transmitter distributor main shaft is supplied through an associated coupler shaft and intermediate gear assembly by the main motor unit, which also supplies the motive power to the typing unit and keyboard signal generator.

c. Preparing Tape. Tape can be prepared on the perforator while sending a message from the keyboard (K–T position of the keyboard control) or while transmitting a message from the transmitter distributor (T position of the keyboard control). Depressing a keylever positions a train of parts within the keyboard code bar mechanism and the associated code bar extensions. The code bar extensions, in turn, control the arrangement of parts within the perforator punch, and typewheel positioning and printing mechanisms. Depression of the keylever also initiates operation of the perforator function mechanism which transmits motion, delivered by the perforator main shaft, to the punch, positioning, and printing mechanisms. Positioning of the various mechanisms simultaneously with the application of motion causes the character desired to be produced as five-unit perforations and a printed character on the tape. Rotary motion to the perforator main shaft is supplied by the main motor unit through the keyboard rear bearing bracket assembly.

643. Main Motor Unit

All of the operating mechanisms of Teletypewriter Set AN/FGC–56 are driven by a single synchronous motor mounted at the rear of the keyboard base within the cabinet. This motor unit is rated at $\frac{1}{12}$ horsepower at 3,600 rpm and requires an ac input of 115-volt, 60-cycle, single-phase power for operation. The stator has two windings: a main operating winding and an auxiliary winding. The auxiliary win ing is in series with the starting capacitor a current-operated starting relay. The init starting current causes the relay to close t circuit to the auxiliary winding. As the rot gains speed, the current flowing through t motor decreases at which point (3,600 rp operating speed) the relay contacts open a the auxiliary winding is disconnected from t circuit. The motor is wired in such a way th the rotor rotates in a counterclockwise dir tion when viewed from the fan end. The sta ing relay and capacitor, together with a therm overload switch, are located in a compartme in the underside of the motor mounting brack assembly. The thermal overload switch is series with both the main and auxilia windings, and, if excessive current is dra (due, for example, to a block rotor) the swit will open the circuit. The switch can be manu ly reset by depressing the pushbutton that pr ects above the mounting plate. Each end of t rotor is equipped with a cooling fan. These fa draw air in through the slots in the end be and exhaust it through the slots in the mot housing. The end bells are equipped with ru ber cushion rings which serve as a means isolating vibration from the cabinet. The rin are held in the motor mounting bracket means of mounting clamps. The motor rot shaft has a tapped hole at each end. The one the right end is used for fastening the exter fan to the shaft and the one on the left is us for securing the intermediate drive gear place. In addition, the left end of the mot rotor shaft is slightly longer than the right e to permit connection of the bearing brack mechanism to the motor shaft by means of coupler. All end play in the main motor taken up by means of a conical preloadi spring which bears against the outer race one of the ball bearings. The main motor u is held in place on the keyboard base by mea of four screws and lockwashers.

644. Mechanical Power Distribution
(fig. 377)

Mechanical motion is delivered by the ma motor unit to the various operating compone of the set through a system of coupler shaf couplers drive gears, and driven gears (fig. 1 The coupler shafts are joined together by t

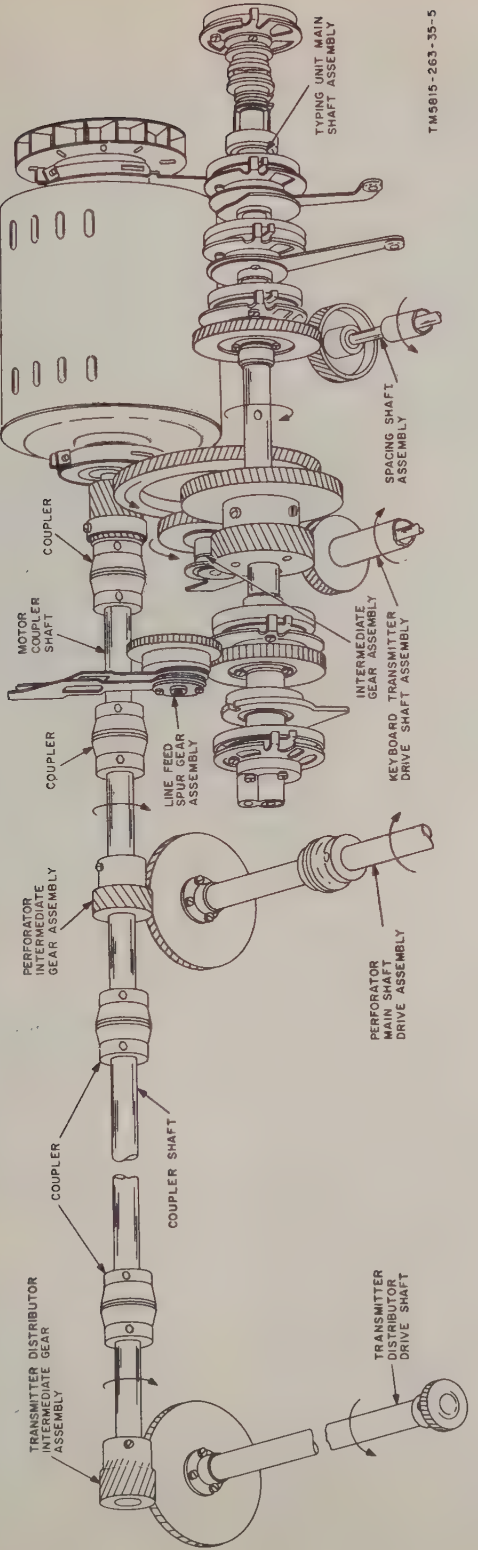

MAIN MOTOR UNIT
TYPING UNIT MAIN SHAFT ASSEMBLY
TM5815-263-35-5
SPACING SHAFT ASSEMBLY
COUPLER
MOTOR COUPLER SHAFT
INTERMEDIATE GEAR ASSEMBLY
KEYBOARD TRANSMITTER DRIVE SHAFT ASSEMBLY
COUPLER
LINE FEED SPUR GEAR ASSEMBLY
PERFORATOR INTERMEDIATE GEAR ASSEMBLY
PERFORATOR MAIN SHAFT DRIVE ASSEMBLY
COUPLER
COUPLER SHAFT
TRANSMITTER DISTRIBUTOR INTERMEDIATE GEAR ASSEMBLY
TRANSMITTER DISTRIBUTOR DRIVE SHAFT

Figure 377. Mechanical power distribution.

couplers to lengthen the left end of the main motor rotor shaft so that it extends almost the full width of the cabinet. Mechanical power is taken off at three points along the length of this extended drive shaft by three drive gears (fastended on the extended drive shaft) which mesh with and drive an associated driven gear. Each driven gear, in turn, is fastened to a shaft or intermediate assembly which connects to the operating component. The drive and driven gears (contained in the bearing bracket mechanism) used with the perforator are not changeable and remain, as installed, for all speeds of operation, whereas the remaining two drive gears and driven gears are part of a set. The ratio between the drive gears and driven gears in these sets determines the maximum speed at which the transmitting and receiving mechanisms will operate. The three gear sets supplied with this equipment permit operation at 368 opm (60 wpm), 460 opm (75 wpm), and 600 opm (100 wpm). The sets are readily replaceable so that when a change in operating speed is required, it is accomplished by installing the appropriate set of gears in place of those contained. In operation, motive power is applied by the main motor to the extended drive shaft which contains the three drive gears. This shaft drives the transmitter distributor main shaft, through the intermediate drive gear that meshes with the driven gear on the rear end of the transmitter distributor drive shaft; the perforator main shaft, through the bearing bracket mechanism, and also applies motion to the keyboard intermediate gear mechanism located adjacent to the main motor unit. With the typing unit in place, the typing unit driving gear of the intermediate shaft meshes with the driven gear on the typing unit main shaft (fig. 378); the keyboard driving gear on the typing unit main shaft meshes with the clutch drum and gear sleeve assembly of the signal generator drive assembly. Thus the keyboard intermediate gear mechanism supplies motion to the typing unit main shaft which, in turn provides mechanical power to the signal generator drive assembly. The extended drive shaft rotates continuously when the equipment is in operation so that all drive gears provide motion to the connecting driven gears and assemblies. Power for a given action is transferred by the clutches contained in each component which, when tripped, drive thei associated mechanism.

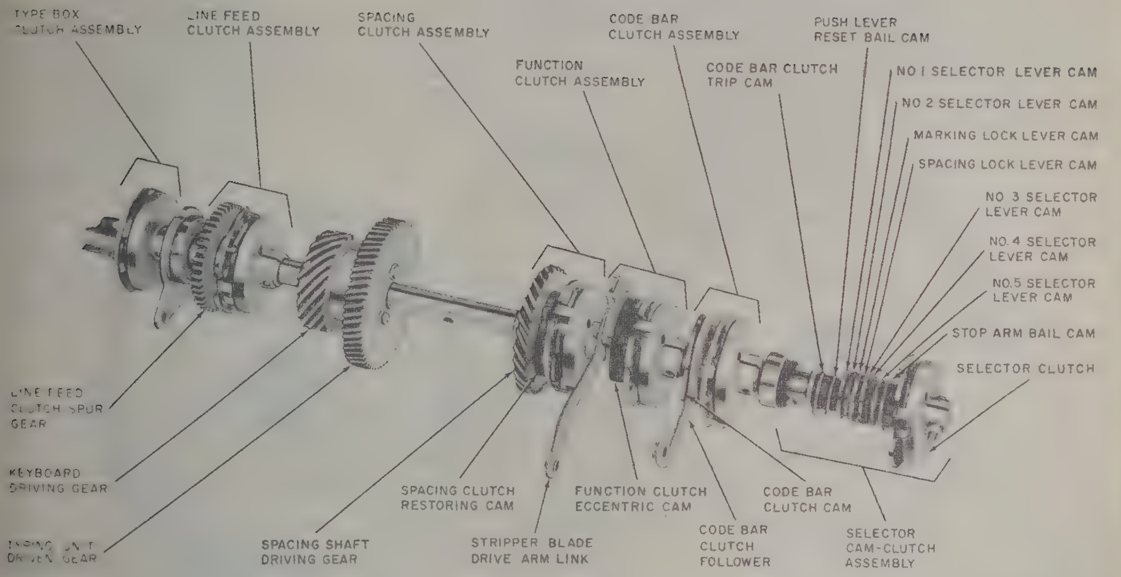
645. Clutch Operation

a. The clutches contained in the various o erating components of the set are all-ste internal expansion types and provide the mea whereby motion is imparted only as would b required to produce a specific action or fun tion. Operation of all of the clutches within th set is essentially the same, and since they a involved in the various phases of send, receiv and preparation of tape, they are described this point.

b. Each clutch has two shoes, primary an secondary, which bear against the inside su face of the serrated clutch drum at four di tinct points. The drum is fastened to a drivin shaft. Consequently, the clutch drum rotat continuously when the main motor is runnin An associated mechanism is attached to th clutch cam disk which rotates upon engageme of the clutch shoes. Clutches operate as follow

(1) View A of figure 379 shows a typic single-stop clutch in the disengage condition. Disengagement occurs whe the lug (B) on the clutch shoe leve and the lug (A) on the clutch cam di are brought close together. The clut shoe lever pivots about its ear (C which is pivoted in a notch in th upper end of the secondary shoe. Th clutch shoe lever ear (D) is moved the right. The clutch shoe spring co tracts to pull the two shoes towa each other and away from the serrat drum surface. Thus the clutch dru continues to rotate but the mechanis attached to the clutch cam disk do not.

(2) View B of figure 379 shows the sam clutch in the engaged condition. E gagement occurs when the lug (A) c the clutch cam disk and the lug (B) c the clutch shoe lever are released. Th clutch shoe lever spring immediate contracts. The clutch shoe lever pivo about its ear (C), overcoming th clutch shoe spring, moving the clut shoe lever ear (D) to the left, a

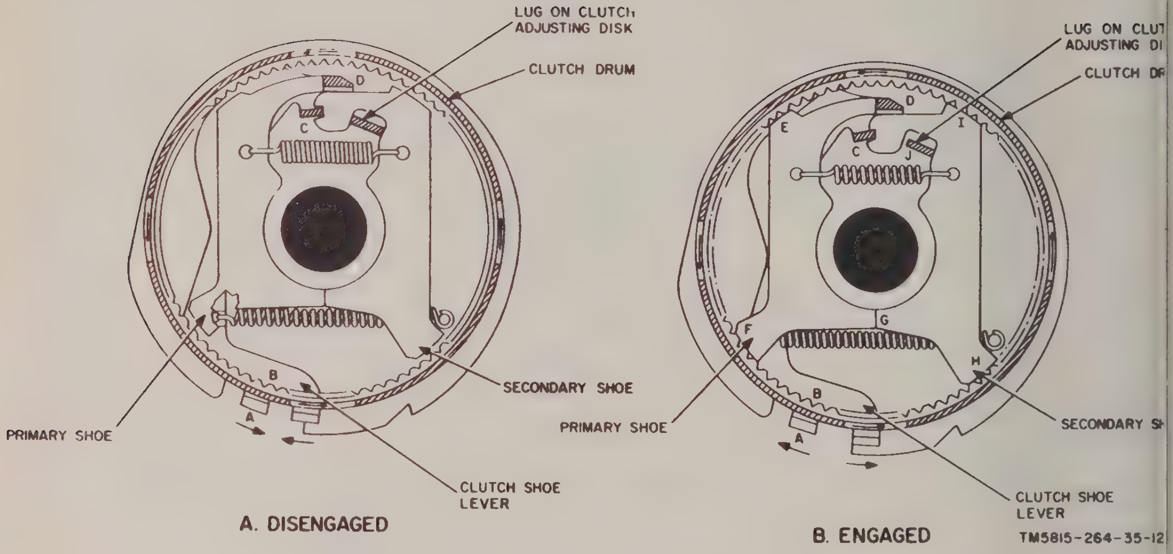

TYPE BOX CLUTCH ASSEMBLY
LINE FEED CLUTCH ASSEMBLY
SPACING CLUTCH ASSEMBLY
FUNCTION CLUTCH ASSEMBLY
CODE BAR CLUTCH ASSEMBLY
CODE BAR CLUTCH TRIP CAM
PUSH LEVER RESET BAIL CAM
NO 1 SELECTOR LEVER CAM
NO 2 SELECTOR LEVER CAM
MARKING LOCK LEVER CAM
SPACING LOCK LEVER CAM
NO 3 SELECTOR LEVER CAM
NO. 4 SELECTOR LEVER CAM
NO. 5 SELECTOR LEVER CAM
STOP ARM BAIL CAM
SELECTOR CLUTCH
LINE FEED CLUTCH SPUR GEAR
KEYBOARD DRIVING GEAR
TYPING UNIT DRIVEN GEAR
SPACING SHAFT DRIVING GEAR
SPACING CLUTCH RESTORING CAM
STRIPPER BLADE DRIVE ARM LINK
FUNCTION CLUTCH ECCENTRIC CAM
CODE BAR CLUTCH FOLLOWER
CODE BAR CLUTCH CAM
SELECTOR CAM-CLUTCH ASSEMBLY

TM5815-264-35-25

Figure 378. Typing unit main shaft, front view.

forcing the primary shoe to contact the serrated drum surface at one point (E). The counterclockwise rotation of the clutch drum drives the primary shoe downward so that it makes contact at a second point (F) on the drum. The movement of the primary shoe in the direction of drum rotation is transferred to the secondary shoe (G) which causes it to bear against the drum at one point (H). The revolving clutch drum drives the secondary shoe upward to make contact with the clutch drum at a second point (I), where a combined force is applied. This combined force is transferred to the lug (J) on the clutch adjusting disk to cause it to rotate with the clutch drum. Since the clutch cam disk which is fastened to the clutch adjusting disk, is attached to some mechanism, that mechanism also rotates with the power applied from the clutch drum.

c. Of all the clutches contained in the set, two of them (the typing unit line feed clutch and spacing clutch) are equipped with three sets of trip lever lugs equally spaced about the clutch periphery. Upon engagement, the spacing clutch will rotate one-third of a revolution, while the line feed clutch will rotate either one-third or two-thirds of a revolution, depending upon whether the single-double line feed lever is set for single or double line feed (par. 695). All of the remaining clutches have only one set of trip lever lugs so that when they become engaged, they will rotate one complete revolution.


LUG ON CLUTCH ADJUSTING DISK
CLUTCH DRUM
D
C
SECONDARY SHOE
PRIMARY SHOE
B
A
CLUTCH SHOE LEVER
LUG ON CLUT ADJUSTING DI
CLUTCH DR
D
E
I
C
J
G
F
H
B
A
PRIMARY SHOE
SECONDARY SH
CLUTCH SHOE LEVER
TM5815-264-35-12

A. DISENGAGED

B. ENGAGED

Figure 379. Clutch operation.

646. Keyboard Code Bar Mechanism

a. The keyboard code bar mechanism arranges various parts, as controlled by the depressing of a keylever, in accordance with the code group (or character) to be transmitted, and initiates operation of the signal generator mechanism for transmission of that code group, or controls the preparation of a tape through the keyboard linkage (par. 657). The code bar mechanism is located in the front underside portion of the keyboard base. Each keylever in the lower three rows (the green keys) and the space bar is connected to a code lever (fig. 381), while each keylever in the top row (red keys) is connected to an associated function lever. The code levers pivot about points near their center portion. Located above the code levers, and positioned parallel to the front of the keyboard are, from rear to front: the clutch trip bar, the numbers one through five code bars, the two character counter bars, and the lock bar. The rear portion of each code lever normally (unoperated) is held in the downward position by a spring so that the front end, with the attached keylever, is held in the upward position. Each code lever and the BREAK function lever is equipped with a wedgelock, contained on the lower front projection (fig. 380). When one of the code levers is operated, its wedgelock is depressed between the lock balls in the lock ball channel to take up all the slack that exists. This prevents any other code from being operated.

b. As the operator depresses keylever (fig. 381), the corresponding code lever, to which it

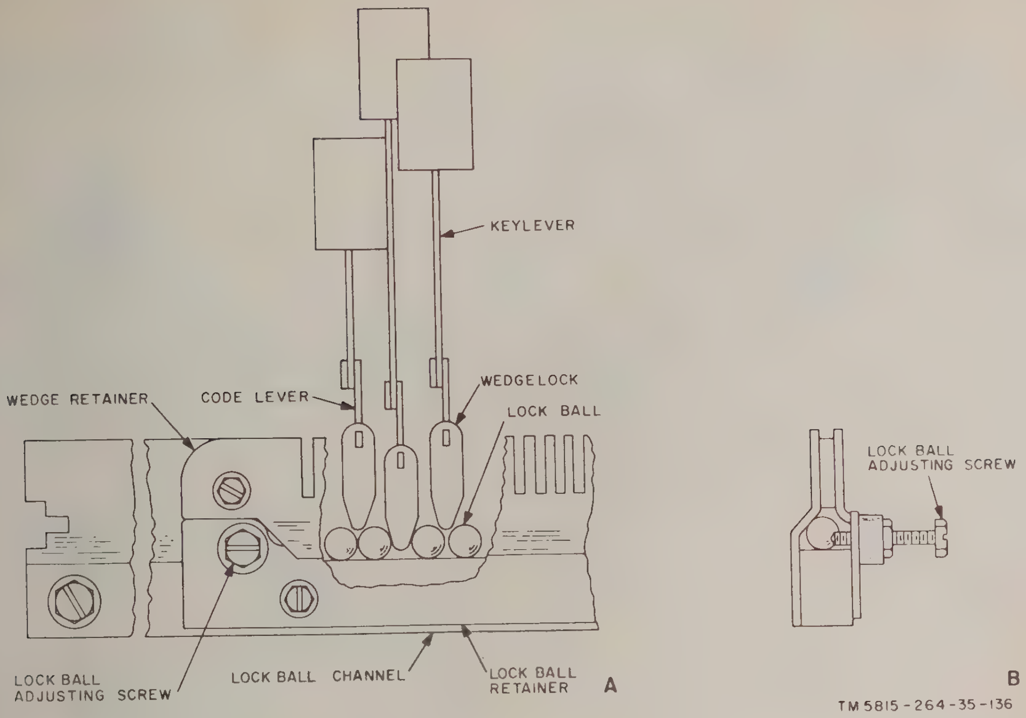


Figure 380. Ball lock bar mechanism, front view.

is attached, is rotated about its pivot point. The rear end of the code lever comes up and raises the code lever universal bail. The extension arm on the top of the code lever universal bail is then moved out of engagement with the step at the rear end of the universal bail latch lever (fig. 382). This occurs when the keylever and corresponding code lever have completed two-thirds of their full travel and is referred to as the trip off point. The universal bail latch lever then moves downward, under the force developed by its spring, to strike the code bar reset bail latch and the non-repeat lever crank, thus carrying them downward. When the corner of the code bar reset bail latch descends beyond the center line of the code bar reset bail roller (fig. 382) mounted on the code bar reset bail, the various spring forces acting on the reset bail (from the code bars through their respective springs) cause it to swing to the right and engage a step on the non-repeat lever (fig. 381). This, in turn, allows the code bars to move to the right in the direction of the forces acting on each code bar (fig. 383). As all this happens, the rear portion of the code lever has been moved to its full (upward) position by the manual input to the keylever, and the code lever may stop some of the code bars from moving to the right (depending on the keylever that was depressed). The code bars have vertical projections (fig. 381) that engage a curved part of the signal generator transfer levers (fig. 384). Those code bars that are permitted to move to the right, also move the corresponding transfer levers to the right. However, those code bars that are stopped because their teeth engage the activated code lever do not move their corresponding transfer levers so that these transfer levers remain in the left hand position.

c. Simultaneously with the trip off of the code bar reset bail and the movement of the

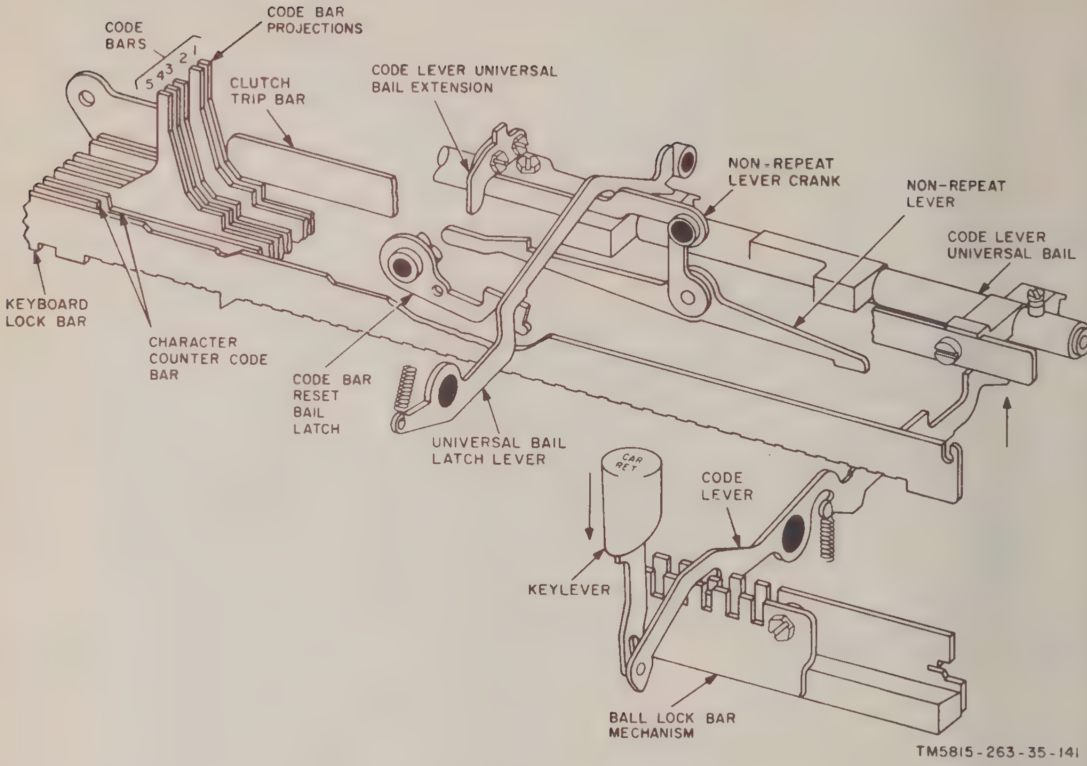

CODE BARS
5
4
3
2
1
CODE BAR PROJECTIONS
CLUTCH TRIP BAR
CODE LEVER UNIVERSAL BAIL EXTENSION
NON-REPEAT LEVER CRANK
NON-REPEAT LEVER
CODE LEVER UNIVERSAL BAIL
KEYBOARD LOCK BAR
CHARACTER COUNTER CODE BAR
CODE BAR RESET BAIL LATCH
UNIVERSAL BAIL LATCH LEVER
CAR RET
CODE LEVER
KEYLEVER
BALL LOCK BAR MECHANISM
TM5815-263-35-141

Figure 381. Keyboard code bar mechanism, front view.

code bars to the right (*b* above), the clutch trip bar, located in the rear of the code bar mechanism (fig. 381), moves to the right as shown in figure 398. A keyboard control selection lever is linked to and moves to the right with the clutch trip bar. When the three-position keyboard control is in the K or K–T position (par. 657), a projection on the keyboard control selection lever trips the signal generator clutch trip lever, thus engaging the clutch which begins operation of the keyboard signal generator mechanism (par. 647). Up to this point all the action has been due to the manual operation of a keylever and associated code lever to result in the tripping off of the latches and movement of parts under spring tension. Mechanical or rotary motion is applied to the signal generator mechanism for the transmission of a code impulse group and for the resetting of parts after the completion of a transmitted group (*d* below).

d. Resetting of the code bars to their original positions (when the keyboard control is in the K or K–T position) takes place after the signal generator transfer levers are locked in place (par. 647*b*), and prepares the keyboard code bar mechanism for transmission of the next character. Resetting is effected by means of an eccentric on the front of the signal generator cam assembly, which drives an eccentric follower arm (fig. 382). This arm engages the eccentric stud on the side of the code bar reset bail and pulls the code bar reset bail to the left as the signal generator cam assembly rotates. At the peak position of the eccentric the code bar reset bail clears the eccentric stud to permit its latch spring to pull it up into the locking

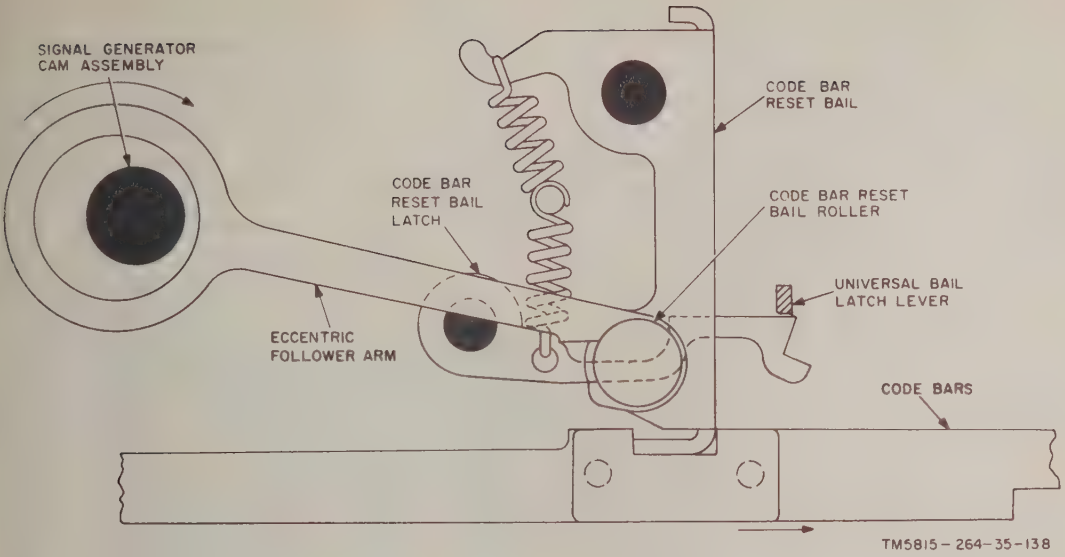

SIGNAL GENERATOR CAM ASSEMBLY
CODE BAR RESET BAIL
CODE BAR RESET BAIL LATCH
CODE BAR RESET BAIL ROLLER
UNIVERSAL BAIL LATCH LEVER
ECCENTRIC FOLLOWER ARM
CODE BARS
TM5815 – 264–35–138

Figure 382. Code bar reset bail, reset position, front view.

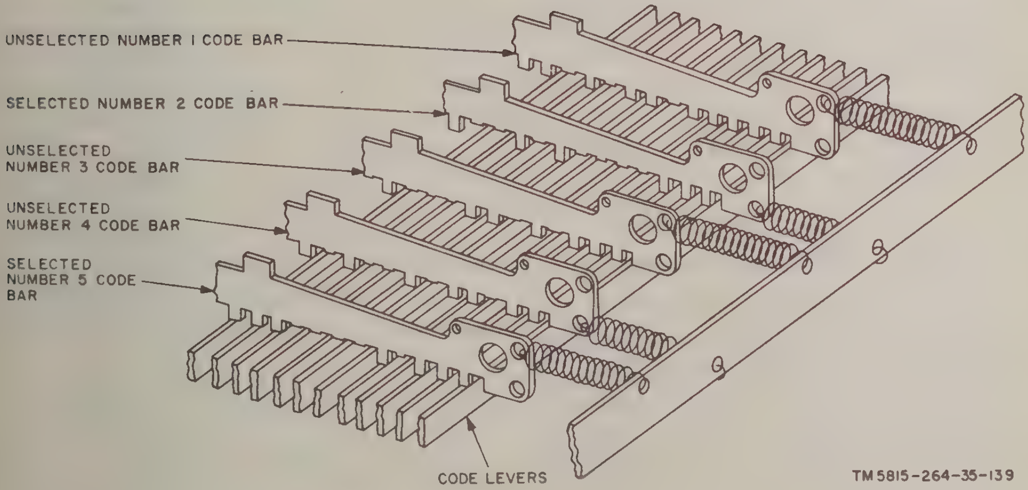

UNSELECTED NUMBER 1 CODE BAR
SELECTED NUMBER 2 CODE BAR
UNSELECTED NUMBER 3 CODE BAR
UNSELECTED NUMBER 4 CODE BAR
SELECTED NUMBER 5 CODE BAR
CODE LEVERS
TM 5815–264–35–139

Figure 383. Code bar selection, front right view.

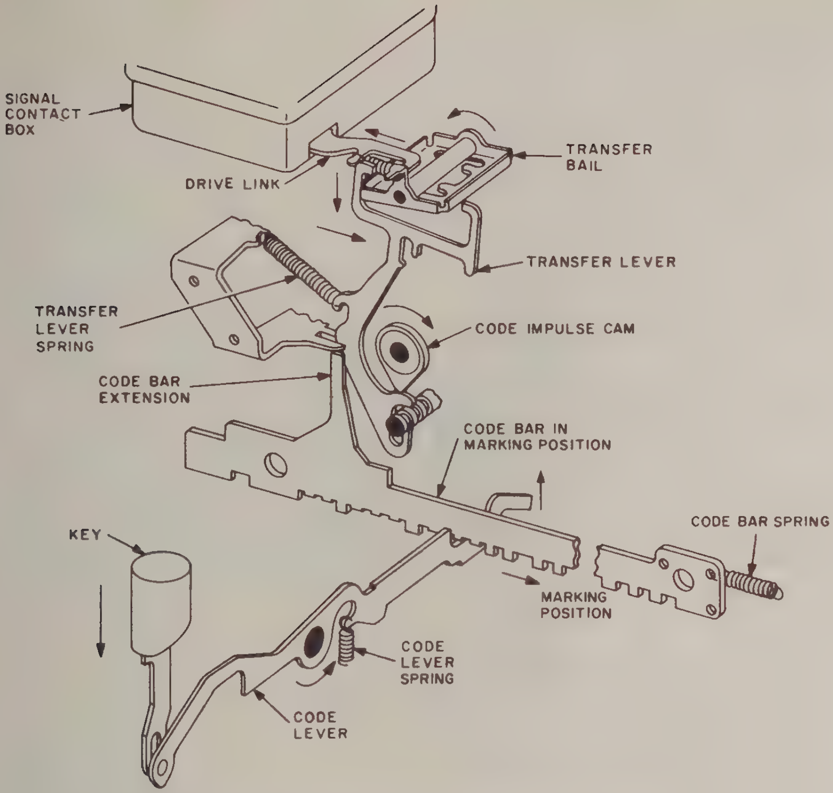
position so that the code bar reset bail becomes latched as the eccentric follower arm returns to its original position. As the code bar reset bail is moved into the left (reset) position, its lower portion engages projections on the code bars and the clutch trip bar, and a step on the non-repeat lever, thus moving all these parts to the left and into the reset position. The reset eccentric portion of the signal generator cam assembly, on which the eccentric follower arm is mounted, is so positioned with relation to the remainder of the signal generator cam assembly that the start of the resetting action occurs near the end of the start pulse (par. 647). Just after the beginning of the number 2 signal pulse, the code bars have been moved to the left a sufficient distance to permit the code lever that set up the code, to drop down from the code lever universal bail (fig. 381). This then permits the code lever universal bail to return to its start position and trip the non-repeat lever off of the code bar reset bail. At the same time an extension on the code lever universal bail moves in under the universal bail latch lever and holds it in almost the same position that the non-repeat lever crank had held it at the start of the reset movement. With the universal bail latch lever held in the upward position, the code bar reset bail continues to move to the left and full reset occurs at 180° of signal generator cam assembly rotation (about one-quarter of the way through the number 3 signal pulse). As soon as the code lever universal bail is permitted to move forward, a second keylever can be struck, thus moving its code lever into position for the transmission of another code group and the sequence described in *a* and *b* above will be repeated.

647. Keyboard Signal Generator Mechanism

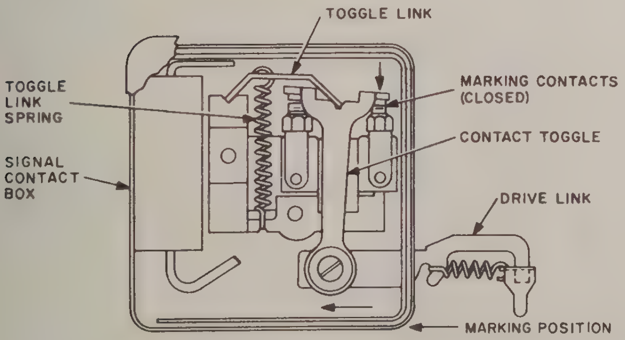
a. The keyboard signal generator mechanism functions to convert the arrangements of parts, as set up by the keyboard code bar mechanism, to the series of electrical pulses corresponding to the character being transmitted. The signal generator mechanism is located on the top front portion of the keyboard base and consists of a group of transfer levers, the transfer bail, the signal generator contact box, and a cam assembly. As was described in paragraph 646*b*, each of the code bars in the code bar mechanism
operates a transfer lever in the signal generato
mechanism (fig. 384). The transfer levers ar
positioned to the left or right (depending o
the code group being transmitted). This pos
tioning controls the operation of the sign
generator contacts through the drive link (
fig. 385) by means of the signal generator ca
assembly and the motion supplied by the mai
motor unit. The signal generator cam asse
bly serves two purposes: one is to insure th
signal pulses of uniform length are tran
mitted; the other is to lock and unlock the tran
fer levers and reset the code bars.

b. Upon trip off of the signal generat
clutch (par. 646*c*), the spring-loaded sho
inside the signal generator clutch mechanis
engage the serrated surface of the clutch dru
and the signal generator cam assembly begi
to rotate. For a complete description of clut
operation, refer to paragraph 645. The sign
generator cam assembly (B, fig. 385) contai
eight individual cams, numbered from rear
front. Since the five-level code must have
start and a stop pulse, the signal generator ca
assembly contains seven signal-pulse cams; t
eighth cam operates the transfer lever locki
bail. The individual cams are so arranged th
the start pulse cam (third from the rear of t
assembly) begins to push downward on its co
responding transfer level at the start of ro
tion. Almost at the same time, the transf
lever locking bail cam moves the transfer lev
locking bail in an upward direction so that
blade portion moves beside the downward p
jection on each of the transfer levers (fig. 38
to lock them to the right or the left of t
transfer lever locking bail blade. (Full lo
does not occur until about halfway through t
start pulse.) Thus, in the first few degrees
cam rotation, the position of the transfer lev
is locked and the code bars are free to be re
to their start or latched positions (par. 646*d*).

c. As the signal generator cam assem
rotates, each cam engages its associated tra
fer lever and pulls it downward. As noted
b above, the number start pulse cam engages
transfer lever first and moves it down. Th
is no code bar (in the code bar mechanism)
engage this transfer lever so that it is alw
held to the left by its spring. As the start pu
cam moves the transfer lever down, the hook


SIGNAL CONTACT BOX
DRIVE LINK
TRANSFER BAIL
TRANSFER LEVER
TRANSFER LEVER SPRING
CODE IMPULSE CAM
CODE BAR EXTENSION
CODE BAR IN MARKING POSITION
CODE BAR SPRING
KEY
MARKING POSITION
CODE LEVER SPRING
CODE LEVER

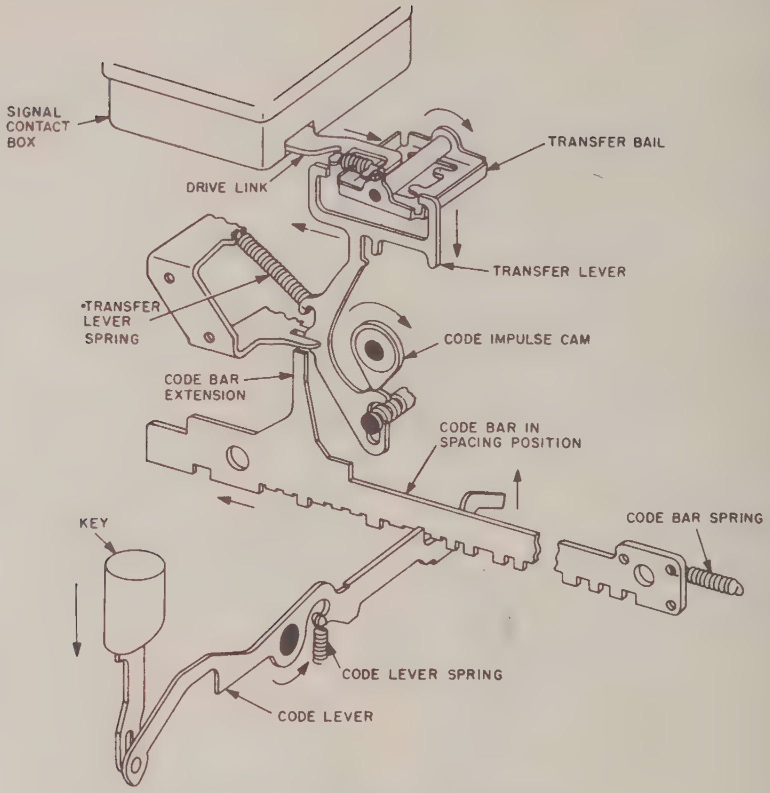
A. CODE IMPULSE TRAIN POSITIONED FOR TRANSMISSION OF MARKING CODE IMPULSE


TOGGLE LINK
TOGGLE LINK SPRING
MARKING CONTACTS (CLOSED)
CONTACT TOGGLE
SIGNAL CONTACT BOX
DRIVE LINK
MARKING POSITION

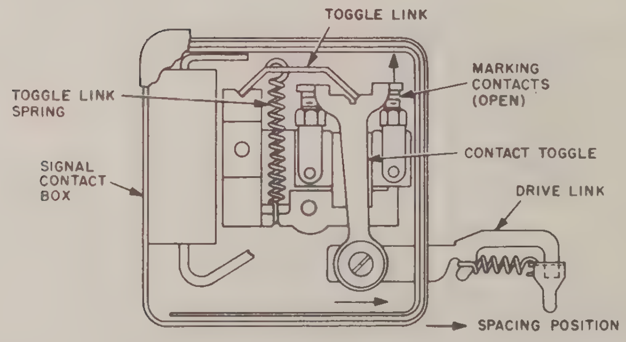
B. MARKING CONTACTS CLOSED FOR TRANSMISSION OF MARKING CODE IMPULSE

TM5815-264-35-140 ①

Figure 384①. Signal generator mechanism, front right view (part 1 of 2).


SIGNAL CONTACT BOX
DRIVE LINK
TRANSFER BAIL
TRANSFER LEVER
•TRANSFER LEVER SPRING
CODE IMPULSE CAM
CODE BAR EXTENSION
CODE BAR IN SPACING POSITION
CODE BAR SPRING
KEY
CODE LEVER SPRING
CODE LEVER

A. CODE IMPULSE TRAIN POSITIONED FOR TRANSMISSION OF SPACING CODE IMPULSE


TOGGLE LINK
TOGGLE LINK SPRING
MARKING CONTACTS (OPEN)
CONTACT TOGGLE
SIGNAL CONTACT BOX
DRIVE LINK
SPACING POSITION

B. MARKING CONTACTS OPEN FOR TRANSMISSION OF SPACING CODE IMPULSE TO LINE

TM5815-264-35-140②

Figure 384②. Signal generator mechanism, front right view (part 2 of 2).

the upper right engages the right side of the transfer bail. This causes the transfer bail to tip to the right, thus moving the drive link to the right. The resulting action of the contact toggle (A, fig. 385) is such that the spacing contacts close and the marking contacts open. Since the marking contacts are the only ones used in neutral signal operation, the result is an interruption in the current flow or a no-current impulse, known as a spacing impulse. The first pulse of any code group is always a spacing impulse. It is during this start impulse that the reset action (par. 647*d*) is begun. As the signal generator cam assembly continues its rotation, the number 1, 2, 3, 4, and 5 cams (sucessively and in the order given) pull their respective transfers levers downward, these transfer levers also engage the transfer bail and tip it to the right or left so that the resulting pulse will be marking or spacing. The stop pulse transfer lever, however, is held to the right by a stop pin, therefore the resulting pulse (stop pulse) is always a marking (current-on) pulse.

d. As was indicated (*b* above), the transfer lever locking bail was actuated by the transfer lever locking bail cam of the signal generator cam assembly. The dwell on the transfer lever locking bail cam is such that the transfer lever locking bail is held in the full lock position until after the beginning of the fifth signal pulse. The transfer lever locking bail cam, at this point, permits the transfer lever locking bail to start moving down out of lock. All the transfer levers are completely free to return to their initial positions at a period about half of the way through the stop pulse. As this occurs, the transfer levers are then prepared for acceptance of the next code sequence.

e. The sequence chart given below lists the operations that occur when any code selecting keylever is depressed. Since both the keyboard code bar mechanism and the signal generator mechanism are interrelated and function during the sending action, the operations described in paragraph 646 and *a* through *d* above are combined into the single chart.

Sending Sequence Chart

<table>
<tr><td colspan="2">1. Keylever is depressed.</td><td colspan="2">Wedgelock takes up slack in the bearing balls of the ball lock mechanism.</td></tr>
<tr><td colspan="4">2. Code lever rotates and strikes the code lever universal bail.</td></tr>
<tr><td colspan="4">3. Code lever universal bail rotates and locks the code lever in position.</td></tr>
<tr><td colspan="4">4. Universal bail latch lever moves down, moving the code bar reset bail latch and the non-repeat lever crank with it</td></tr>
<tr><td colspan="4">5. Code bar reset bail latch releases the code bar reset bail.</td></tr>
<tr><td>6. Code bar reset bail moves to the right and engages a step on the non-repeat lever.</td><td>Clutch trip bar and selected code bars move to the right. (Unselected bars are blocked.)</td><td>Signal generator transfer levers position to left and right.</td><td>Keyboard control selection lever moves the clutch trip lever from the stop lug of signal generator clutch.</td></tr>
<tr><td colspan="4"><i>Note:</i> The keylever can be released at this point.</td></tr>
<tr><td colspan="2">7. Signal generator clutch engages.</td><td colspan="2">Signal generator cam assembly begins to rotate.</td></tr>
<tr><td colspan="2">8. Start pulse cam of the signal generator cam assembly pushes the number 3 transfer lever downward and tips the transfer bail.</td><td colspan="2">Transfer lever locking bail cam moves the transfer lever locking bail upward and locks the transfer levers in place.</td></tr>
</table>

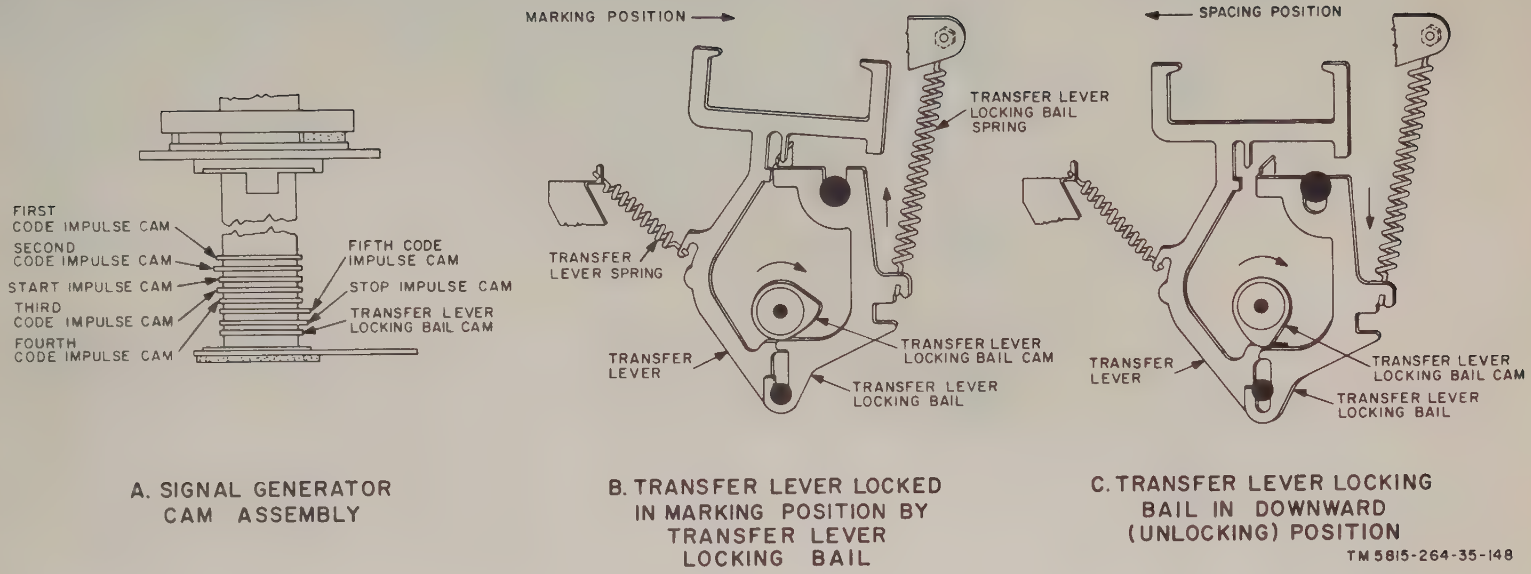
Sending Sequence Chart—Continued

9. Transfer bail moves the contact toggle through the drive link to send the start impulse.	Cam assembly eccentric starts to move the eccentr follower arm and code bar reset bail to the left.	
10. Number 1 cam of the signal generator cam assembly pushes the number 1 transfer lever downward and ti the transfer bail.		
11. Transfer bail moves the contact toggle through the drive link to send the number 1 code impulse.	Cam assembly eccentric continues to move the eccentr follower arm and code bar reset bail (together wi the code bars and clutch trip bar) to the left.	
12. Number 2 cam pushes the number 2 transfer lever downward and tips the transfer bail.		
13. Transfer bail moves the contact toggle through the drive link to send the number 2 code impulse.	Code lever universal bail drops back to the start position, moves an extension under the universal bail latch lever, and releases the code lever. A second keylever may be depressed at this point.	Cam assembly eccentric continues move eccentric follower arm ar code bar reset bail to the left.
14. Number 3 cam pushes the number 3 transfer lever downward and tips the transfer bail.		
15. Transfer bail moves the contact toggle through the drive link to send the number 3 code impulse.	Code bar reset bail latch drops down to secure the co bar reset bail (together with the code bars and clutc trip bar) in the fully latched position.	
16. Number 4 cam pushes the number 4 transfer lever downward and tips the transfer bail.		
17. Transfer bail moves the contact toggle through the drive link to send the number 4 code impulse.		
18. Number 5 cam pushes the number 5 transfer lever downward and tips the transfer bail.		
19. Transfer bail moves the contact toggle through the drive link to send the number 5 code impulse.	Number 8 cam permits the transfer lever locking ba to begin moving out of the lock position.	
20. The stop pulse cam pushes the stop pulse transfer lever downward and tips the transfer bail.		
21. Transfer bail moves the contact toggle through the drive link to send the stop impulse.	Transfer lever locking bail returns to start position.	Transfer levers return to start pos tion (unless another keylever w depressed).
22. Clutch stop lug strikes clutch trip lever and clutch disengages.		

648. Local Line Feed Mechanism

a. The local line feed mechanism is provided on the keyboard to permit operation of the line feed mechanism on the local typing unit to provide paper feed out without disturbing other operating units on the same line. The local line feed mechanism can be operated at any time when the equipment power is on by depressing the LOC LF keylever.

b. Depressing the LOC LF keylever causes the associated function lever (fig. 386) to rotate about its pivot. The rear portion of the code lever contacts the lip on the lower end of th local line feed bail, causing it, in turn, to rotat about its pivot. As this occurs, the upper en of the local line feed bail pushes the local lir feed trip link to the rear until it engages th line feed clutch trip lever of the typing uni Movement of the line feed clutch trip leve causes the line feed clutch to engage, thu feeding paper out from the typing unit. Pape will continue to feed until the LOC LF keyleve is released and the parts are returned to the starting positions by the tensions of th


MARKING POSITION →
← SPACING POSITION
FIRST CODE IMPULSE CAM
SECOND CODE IMPULSE CAM
START IMPULSE CAM
THIRD CODE IMPULSE CAM
FOURTH CODE IMPULSE CAM
FIFTH CODE IMPULSE CAM
STOP IMPULSE CAM
TRANSFER LEVER LOCKING BAIL CAM
TRANSFER LEVER SPRING
TRANSFER LEVER
TRANSFER LEVER LOCKING BAIL SPRING
TRANSFER LEVER LOCKING BAIL CAM
TRANSFER LEVER LOCKING BAIL
TRANSFER LEVER
TRANSFER LEVER LOCKING BAIL CAM
TRANSFER LEVER LOCKING BAIL
TM 5815-264-35-148

A. SIGNAL GENERATOR CAM ASSEMBLY

B. TRANSFER LEVER LOCKED IN MARKING POSITION BY TRANSFER LEVER LOCKING BAIL

C. TRANSFER LEVER LOCKING BAIL IN DOWNWARD (UNLOCKING) POSITION

Figure 385. Signal generator contact box and signal generator cam assembly.

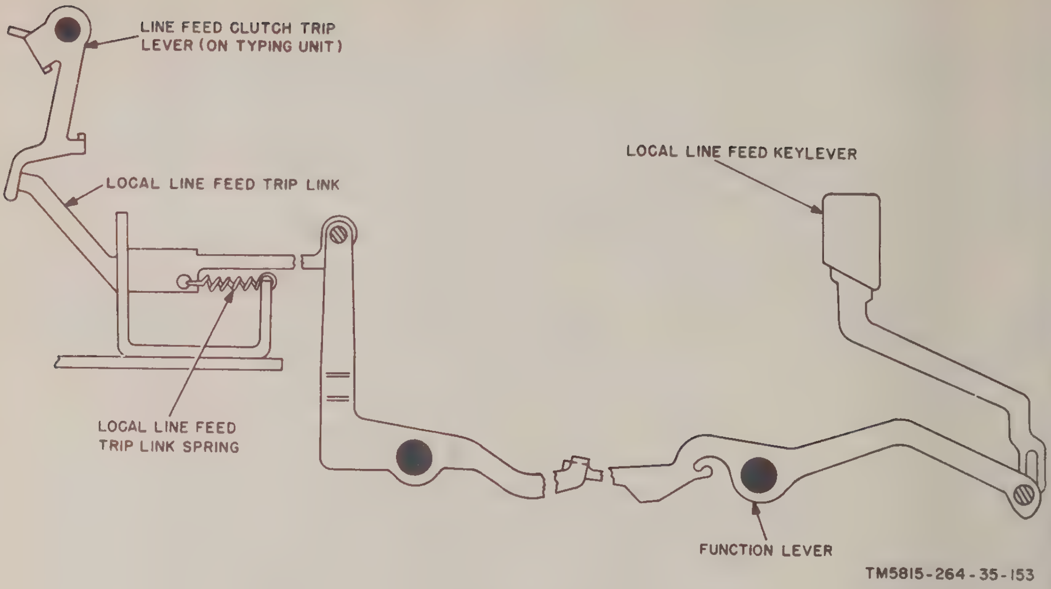

LINE FEED CLUTCH TRIP LEVER (ON TYPING UNIT)
LOCAL LINE FEED KEYLEVER
LOCAL LINE FEED TRIP LINK
LOCAL LINE FEED TRIP LINK SPRING
FUNCTION LEVER
TM5815-264-35-153

Figure 386. Local line feed mechanism, left side view.

springs. For a complete description of the typing unit line feed mechanism, refer to paragraph 695.

c. The sequence chart given below lists the operations that occur when the LOC LF keylever is depressed.

Local Line Feed Sequence Chart

1	LOC LF keylever is depressed
2	Function lever rotates and contacts the local line feed bail.
3	Local line feed bail pushes local line feed trip link rearward.
4	Local line feed trip link pushes line feed clutch trip lever on the typing unit rearward.
5	Line feed clutch on typing unit engages to operate line feed mechanism.
6	Paper feeds out of typing unit

649. Receive Mechanism

a. The receive mechanism functions to electrically block operation of the transmitting circuits, thus rendering the local keyboard and transmitter distributor inoperative. The receive mechanism is put into operation from either the local keyboard, by depressing the REC keylever, or from the local typing unit, by t operation of the keyboard lock function mech nism. The keyboard lock function mechanis will operate upon reception of a break signal end-of-message signal, or when the equipme power is turned off.

b. Depressing the REC keylever (fig. 38 causes the associated keyboard lock functi lever to rotate about its pivot, thus raising t lock bar latch. Spring tension on the right e of the keyboard lock bar provided by the co tact arms of the send receive switch S10 caus it to move to the extreme right hand positio As this happens, certain contacts on the se receive switch S10 open and others close. T closed contacts place a shunt across the sign generator contacts (par. 712*c*(2)) while t open contacts interrupt the circuit to the tran mitter distributor clutch trip magnet E8, l (par. 711*e*). Should any of the code selecti keylevers be operated, the shunting acti would prevent any transmission from the ke board transmitter. The open circuit in t transmitter distributor clutch trip magnet c cuit prevents the magnet from being energiz

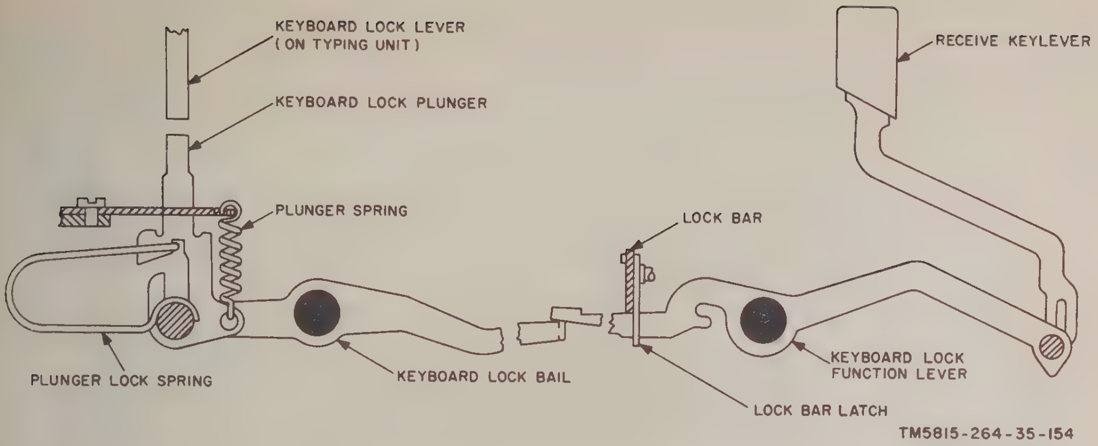


Figure 387. Keyboard receive mechanism, left side view.

so that transmission from this point is impossible.

c. When an end-of-message signal (three blanks in succession) or a break signal is received, or the machine is shut down, the keyboard lock function on the local typing unit is made to operate. (The typing unit keyboard lock mechanism is fully described in paragraph 700.) The resultant action is a downward movement of the typing unit keyboard lock lever (fig. 387). The keyboard lock lever strikes the keyboard lock plunger and moves it downward. As the keyboard lock plunger moves,it causes the keyboard lock bail to rotate about its pivot so that its forward end raises the keyboard lock function lever. As with manual (REC keylever) operation, this raises the lock bar latch, permitting the keyboard lock bar to move to the right, thus operating the send receive switch S10.

d. The sequence chart given below summarizes the actions that take place when the REC keylever is depressed or a keyboard lock function is initiated at the typing unit.

Receive Mechanism Sequence Chart

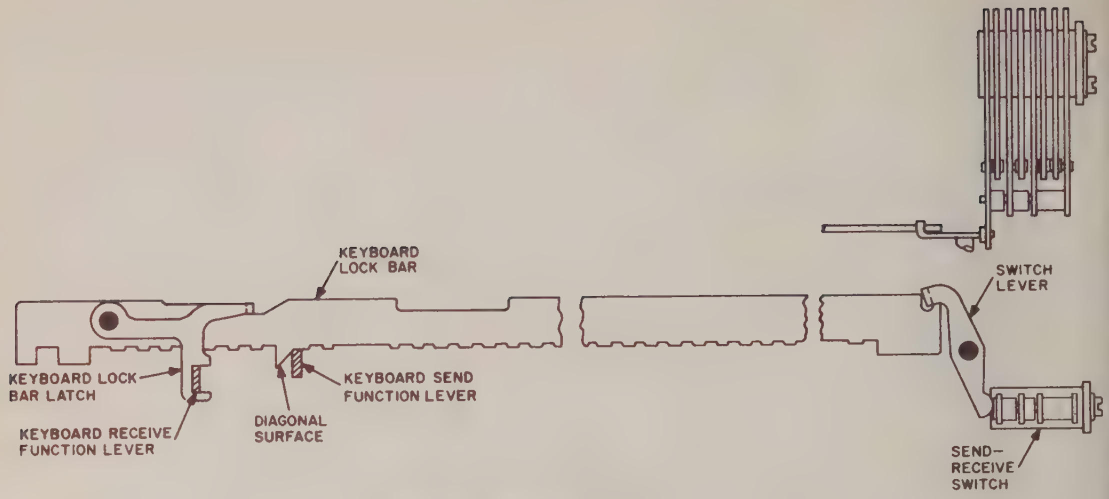
1	REC keylever is depressed, or typing unit keyboard lock lever contacts the keyboard lock plunger to move the keyboard lock bail.
2	Function lever releases the lock bar latch
3	Keyboard lock bar moves to the right
4	Send receive switch S10 operates
5	Keyboard signal generator contacts become shunted and the transmitter distributor clutch trip magnet circuit is opened.

650. Send Mechanism

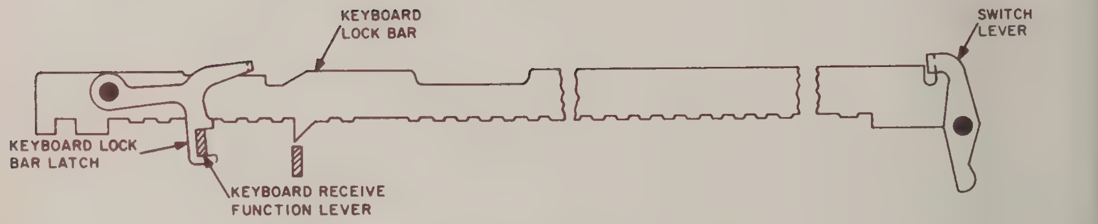
a. The send mechanism functions to unblock or free the transmitting circuits in order to permit use of the local keyboard or transmitter distributor after being rendered inoperative by the receive mechanism (par. 649). It can only be operated by depressing the SEND keylever on the local keyboard.

b. Depressing the SEND keylever (fig. 389) causes the keyboard unlock function lever to rotate about its pivot. As this happens, the rear portion of the keyboard unlock function lever rises against the diagonal camming surface of the keyboard lock bar (A, fig. 388) exerting pressure to overcome the tension of the send receive switch contact arms. This causes the keyboard lock bar to move to the left until the keyboard lock bar latch falls into the notch on the top edge of the keyboard lock bar, holding it in place. In this position, the opening and closing of various contacts makes transmission from either the keyboard or transmitter distributor possible.

c. The sequence chart given below lists the


KEYBOARD LOCK BAR
SWITCH LEVER
KEYBOARD LOCK BAR LATCH
KEYBOARD SEND FUNCTION LEVER
DIAGONAL SURFACE
KEYBOARD RECEIVE FUNCTION LEVER
SEND-RECEIVE SWITCH

A. RECEIVE UNLOCK POSITION


KEYBOARD LOCK BAR
SWITCH LEVER
KEYBOARD LOCK BAR LATCH
KEYBOARD RECEIVE FUNCTION LEVER

B. SEND LOCK POSITION

TM5815-263-35-142

Figure 388. Electrical lock mechanism, front view.

operations that occur when the SEND keylever is depressed.

Send Mechanism Sequence Chart

1	SEND keylever is depressed
2	Keyboard unlock function lever moves in contact with the diagonal camming surface on the keyboard lock bar.
3	Keyboard lock bar moves to the left, operating the send receive switch S10.
4	Keyboard lock bar latch drops in the notch to hold the keyboard lock bar in place.

651. Break Mechanism

a. The break mechanism provides a means o interrupting the signal line for use as a brea signal. Operation of the break mechanism i effected by means of the BREAK keylever o the keyboard.

b. Depressing the BREAK keylever (fig 390) causes the associated function lever t rotate about its pivot. As this occurs, the rea portion of the function lever raises the fron end of the break lever. The break lever, in tur

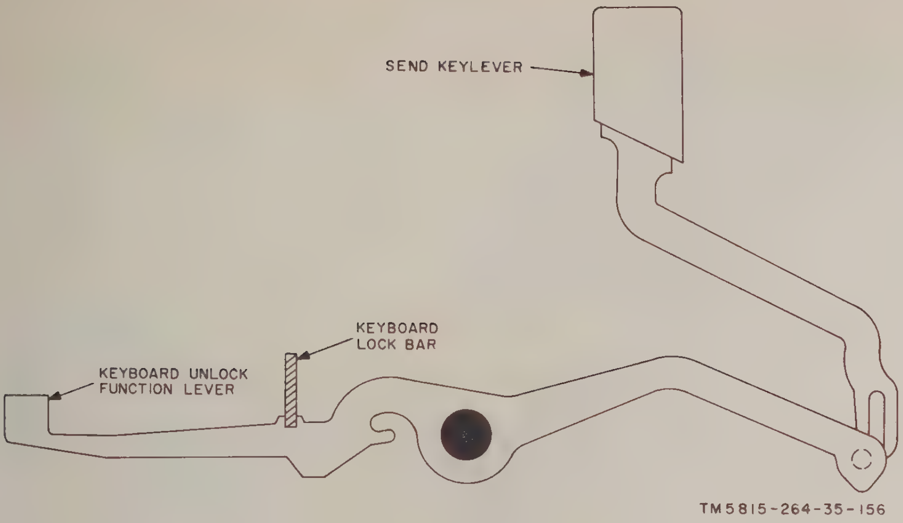

SEND KEYLEVER
KEYBOARD LOCK BAR
KEYBOARD UNLOCK FUNCTION LEVER
TM5815-264-35-156

Figure 389. Keyboard send mechanism, left side view.

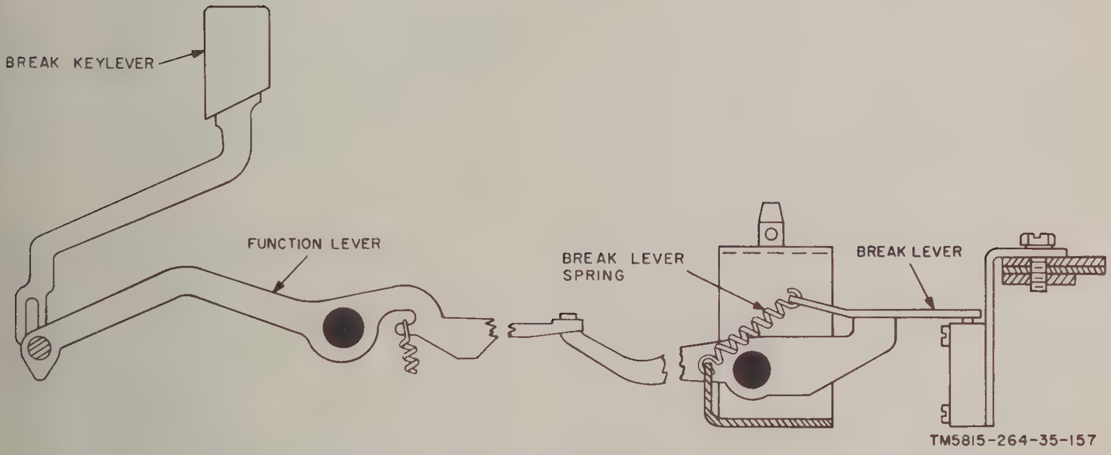

BREAK KEYLEVER
FUNCTION LEVER
BREAK LEVER SPRING
BREAK LEVER
TM5815-264-35-157

Figure 390. Break mechanism, right side view.

rotates about its pivot point so that its rear portion depresses the actuator pin of the line break switch S7 to open the normally-closed contacts. This action breaks the continuity of the signal line to interrupt any transmission n progress. (Refer to par. 711*c* for a complete description of the line break switch circuit theory.) Releasing the keylever causes all parts to be returned to their original positions through the combined tensions of the break lever spring and function lever spring.

c. The following sequence chart lists the operations that occur when the BREAK keylever is depressed.

Break Mechanism Sequence Chart

1 BREAK keylever is depressed
2 Function lever rotates and pushes break lever
3 Break lever rotates and pushes switch actuator
4 Line break switch S7 opens signal line

652. Keyboard Tape Backspace Mechanism

a. The keyboard tape backspace mechanism controls the operation of the power drive backspace mechanism on the perforator. It consists of a tape backspace (TAPE B.SP.) keylever and a tape backspace switch S8.

b. When the TAPE B.SP. keylever is depressed (fig. 391), it causes the associated lever arm to contact and depress the actuating button on the tape backspace switch S8. As this happens, the circuit to the backspace magnet E6 of the power drive backspace mechanism is closed, applying power to the magnet. (See par. 711*d* for circuit theory.) The power drive backspace mechanism will then move the prepared tape backward one position for each time the keylever is depressed (par. 671).

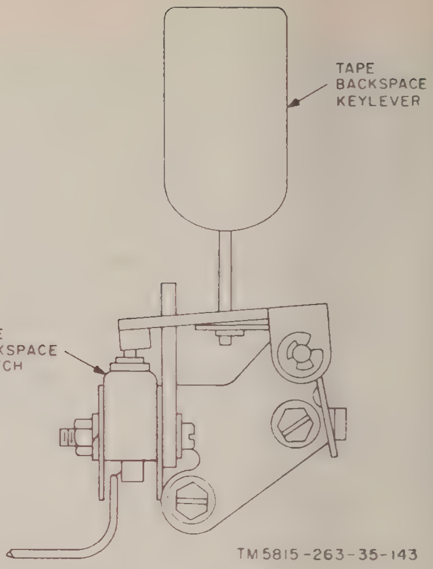


Figure 391. Keyboard tape backspace mechanism, righ side view.

653. Repeat Mechanism
(figs. 381 and 392)

a. The repeat mechanism provides a means of repeating a character or function without the necessity of striking the desired character or function keylever a number of times in succession. The repeat mechanism is put into operation by depressing the REPT keylever simultaneously with one of the character keylevers in the lower three rows or the space bar, and holding down the REPT keylever. The character will be repeated for the length of time the REPT keylever is held down.

b. As the REPT keylever is depressed (with a code selecting keylever) it causes the repeat function lever to rotate about its pivot point. The rear of the repeat function lever rises and contacts the right end of the non-repeat lever and, in turn, causes it to rotate about its pivot. As this occurs, the left end of the non-repeat lever is prevented from engaging with the code bar reset bail so that the non-repeat lever crank will not allow the code bar reset bail latch to engage the code bar reset bail. Since this happens, the code bar reset bail and the universal bail latch lever cannot return to th latched position and the code bar reset bai follows the eccentric arm back and forth unti the REPT keylever is released. Since the cod bar reset bail is kept in the operated position so also is the code bar universal bail. Thus, th selected code lever is not released and the char acter is repeated.

c. The following chart lists the operation (in sequence) that occur when the repea mechanism is operated.

Repeat Sequence Chart

1 REPT keylever is depressed (together with code selecting keylever).
2 Repeat function lever rotates and contacts th non-repeat lever.
3 Non-repeat lever blocked from engaging th code bar reset bail.
4 Code bar reset bail latch and universal bai latch lever held in unlatched condition.
5 Character continually repeats until REPT key lever is released.

654. Local Carriage Return Mechanism

a. The local carriage return mechanism (fig 393) enables the operator to trip the carriag

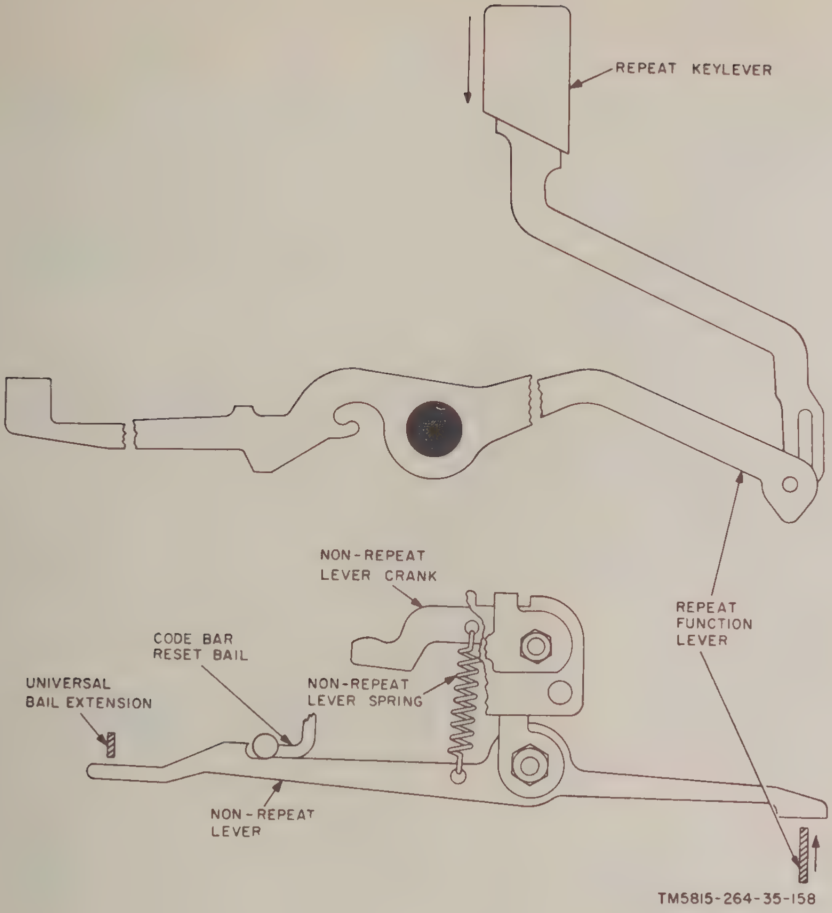

REPEAT KEYLEVER
NON-REPEAT LEVER CRANK
CODE BAR RESET BAIL
UNIVERSAL BAIL EXTENSION
NON-REPEAT LEVER SPRING
REPEAT FUNCTION LEVER
NON-REPEAT LEVER
TM5815-264-35-158

Figure 392. Repeat mechanism, left side view.

return mechanism of the associated typing unit, thereby causing the type box carriage to be returned to the left-hand margin (the beginning of a line of copy) without sending the carriage return signal to other units on the line. Operation of the local carriage return mechanism is effected by depressing the LOC CR keylever on the local keyboard.

b. As the LOC CR keylever is depressed, it rotates the associated function lever about its pivot point so that the rear portion rises and moves the forward end of the local carriage return bail upward. This bail rotates about its pivot until the upper end engages the carriage return lever of the typing unit to actuate the carriage return bail without generating a carriage return signal. (Operation of the carriage return mechanism is fully described in par. 694.)

c. The following sequence chart summarizes the actions described in *b* above.

Local Carriage Return Sequence Chart

1	LOC CR keylever is depressed
2	Local carriage return function lever rises and moves the local carriage return bail.
3	Local carriage return bail engages the carriage return lever on the typing unit.
4	Carriage return mechanism on the typing unit operates to move the type box carriage to the left hand margin.

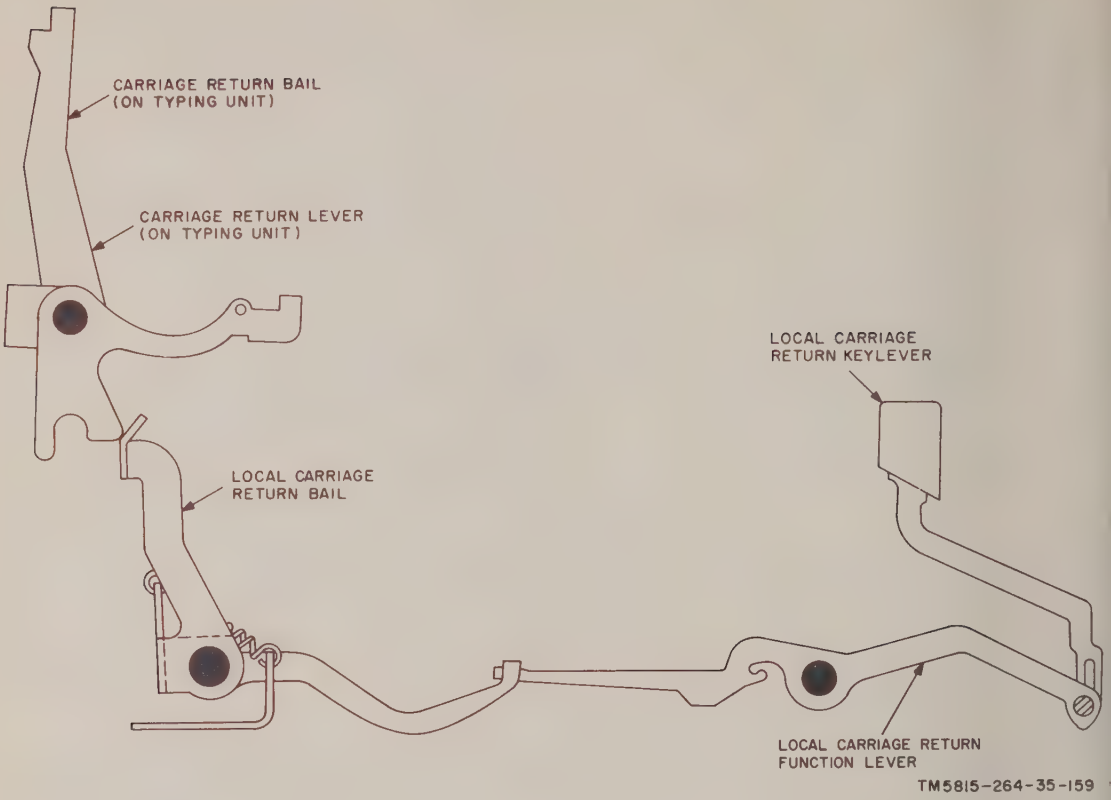
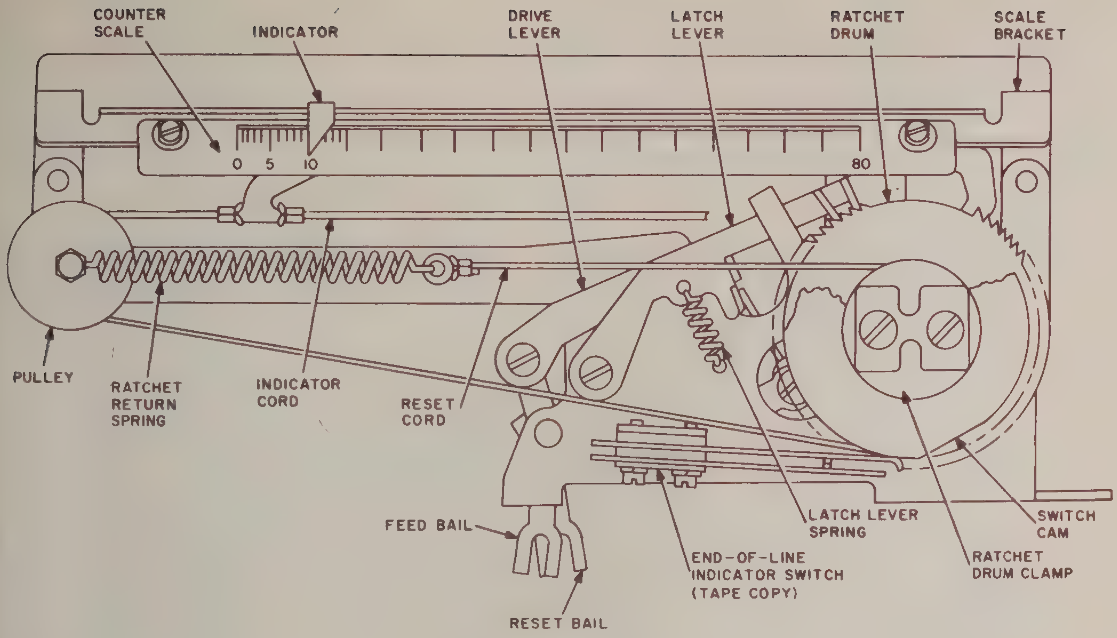

CARRIAGE RETURN BAIL (ON TYPING UNIT)
CARRIAGE RETURN LEVER (ON TYPING UNIT)
LOCAL CARRIAGE RETURN KEYLEVER
LOCAL CARRIAGE RETURN BAIL
LOCAL CARRIAGE RETURN FUNCTION LEVER
TM5815-264-35-159

Figure 393. Local carriage return mechanism, left side view.

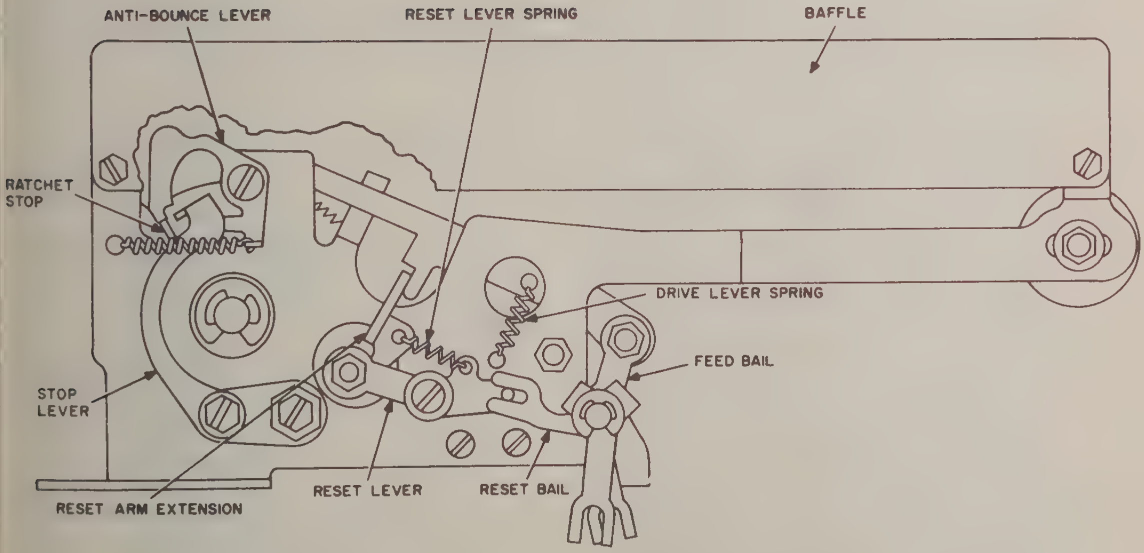
655. Character Counter Mechanism

a. General. The character counter mechanism provides an accurate method of monitoring the number of characters punched when preparing tape for maintaining proper line length. It operates only when the keyboard control is set to the K–T or T position. The character counter is driven mechanically from the keyboard base by the action of the counter and carriage return code bars located in the second and third slots of the keyboard code bar mechanism (fig. 381). These bars contain drive projections which engage the forks of the feed and reset bails of the character counter (fig. 394). As the code bars move to the right each time a keylever on the keyboard is struck, the counter mechanism is tripped and the ratchet drum advances one position. Since the indicato is connected to a cord attached to the drum, i advances one point on the scale. As the carriage return keylever is depressed, the indicato is returned to the zero or starting position During a given operating sequence, the character counter passes through three distinc phases of operation, as shown in figure 395 The various parts of the mechanism are show in figure 394.

b. Stepping. Referring to sequence A o figure 395, as a keylever is struck, the code bar move to the right, also moving the feed bail to the right. The drive lever, which is linked t the feed bail, moves to the left slightly mor than one ratchet tooth. As the code bars ar reset under power, the feed bail 1 moves t


COUNTER SCALE
INDICATOR
DRIVE LEVER
LATCH LEVER
RATCHET DRUM
SCALE BRACKET
0
5
10
80
PULLEY
RATCHET RETURN SPRING
INDICATOR CORD
RESET CORD
FEED BAIL
LATCH LEVER SPRING
SWITCH CAM
END-OF-LINE INDICATOR SWITCH (TAPE COPY)
RATCHET DRUM CLAMP
RESET BAIL

A. FRONT VIEW


ANTI-BOUNCE LEVER
RESET LEVER SPRING
BAFFLE
RATCHET STOP
DRIVE LEVER SPRING
FEED BAIL
STOP LEVER
RESET ARM EXTENSION
RESET LEVER
RESET BAIL

B. REAR VIEW

TM5815-263-35-144

Figure 394. Character counter mechanism.

the left, causing the drive lever to advance the ratchet drum one tooth. The drive lever pawl prevents the ratchet drum from rotating counterclockwise until it is again tripped for the next succeeding character. When this occurs, the ratchet drum rotates slightly counterclockwise and comes to rest against the latch lever.

c. Counter Reset.

(1) Sequence B of figure 395 illustrates the tripped position of the counter-mechanism for a reset function, which occurs after the CAR RET keylever is struck. When this happens, reset bail 2 moves to the right as its code bar moves to the right, causing the reset lever, in turn, to rotate clockwise. As the reset lever rotates clockwise, the reset lever extension moves downward until it falls under the shoulder of the projection on the drive and latch levers under the tension of its spring. When the character counter bars become reset, as in C of figure 395, the reset bail is rotated to the left to its original position, causing the reset lever to rotate counterclockwise, carrying the reset lever extension upward and moving both the drive and latch levers out of engagement with the ratchet teeth. The drive and latch levers remain in this condition and the ratchet drum rotates rapidly in the counterclockwise direction (under the action of its return spring) until it reaches the zero or starting position.

(2) As the ratchet drum reaches its zero position, a stop on the ratchet strikes the stop lever (fig. 394) fastened to the frame. The impact is transmitted through the stop lever to the anti-bounce lever, the lower end of which is normally in contact with the stop lever. The anti-bounce lever, in turn, rotates counterclockwise, dropping in behind the ratchet stop. As the ratchet drum rebounds from the stop lever, its stop strikes the anti-bounce lever, preventing further motion and maintaining the anti-bounce lever in its actuated position. The ratchet continues to operate between the stop lever and anti-bounce lever until the energy in the system (due to the returning force) has been dissipated. The ratchet stop then remains in contact with the stop lever, permitting the anti-bounce lever to return to its normal position.

d. Restart. Sequence D of figure 395 illustrates the restarting action of the character counter mechanism for the first character following a carriage return. As a keylever on the keyboard is depressed, the counter code bar moves to the right, the feed bail moves to the right and the drive lever moves to the left. As the drive lever moves toward the left, it becomes disengaged from the reset lever extension and falls into engagement with the ratchet tooth. As the code bars are reset under power, the feed bail rotates clockwise and the drive lever begins to move to the right. As it does, its projection pushes the reset lever extension to the right and out of engagement with the latch lever, which falls into engagement with the ratchet drum. As the drive lever completes its stroke, it steps the ratchet one tooth as in the normal stepping operation (*b* above).

e. Sequence Chart. The following chart lists the sequence of operations for the character counter, including all three phases of operation (*b* through *d* above).

Character Counter Sequence Chart

1	Keylever is struck and the character counter code bars move to the right.	
2	Feed bail moves to the right and moves the drive lever slightly more than one tooth to the left.	
3	Code bars move to their reset position	
4	Feed bail moves to the left and moves the drive lever to the right.	
5	Ratchet drum advances one ratchet tooth.	Indicator cord advances the indicator one point on the scale.
6	Drive lever pawl locks the setting and prevents the ratchet drum from moving backward.	
7	Steps 1 through 6 are repeated for each character until the end of a line is reached and the CAR RET keylever is struck.	
8	CAR RET keylever is depressed and the code bars move to the right.	
9	Reset bail moves to the right causing the reset lever to rotate clockwise.	
10	Reset lever extension falls into the shoulder of the drive and latch levers.	

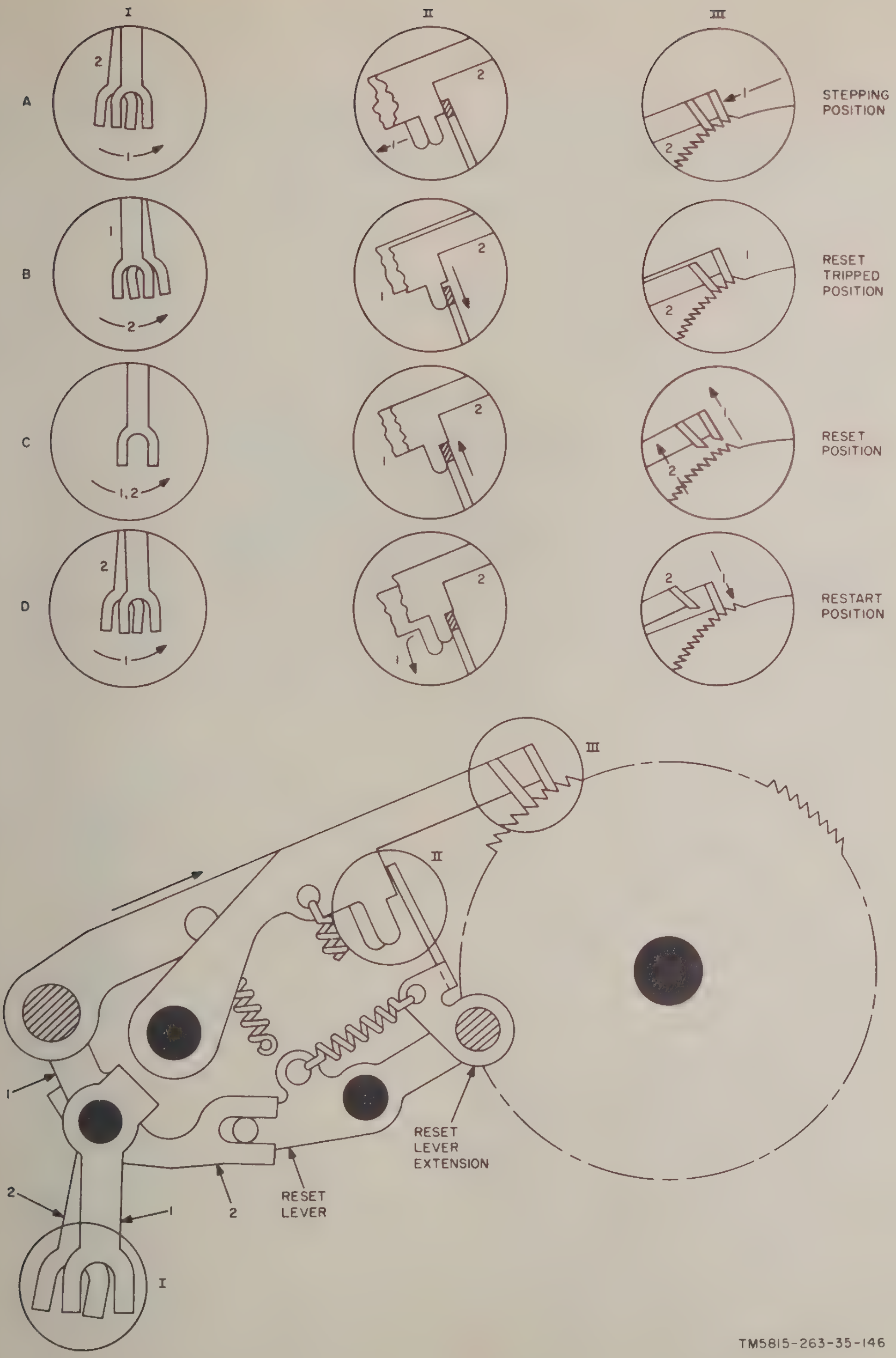

I
II
III
A
B
C
D
STEPPING POSITION
RESET TRIPPED POSITION
RESET POSITION
RESTART POSITION
1
2
1, 2
RESET LEVER EXTENSION
RESET LEVER

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Figure 395. Character counter operation, front view.

Character Counter Sequence Chart—Continued

11	Code bars move to the reset position.	Reset bail moves to the left, moving the reset lever upward.
12	Reset lever moves the reset lever extension upward against the drive and latch levers.	
13	Drive and latch levers move out of engagement with the ratchet drum teeth.	
14	Ratchet drum rotates counterclockwise under its spring tension, carrying the indicator toward the zero position on the scale.	
15	Ratchet drum arrives at zero position.	Stop on the ratchet drum strikes the stop lever.
16	Stop lever strikes the anti-bounce lever.	
17	Anti-bounce lever rotates clockwise and drops in behind the ratchet drum stop preventing further motion.	
18	Keylever is struck, starting the counting sequence for the next line and the code bars move to the right.	
19	Feed bail moves to the right, moving the drive lever to the left.	
20	Drive lever disengages from the reset lever extension and engages a ratchet tooth.	
21	Code bars move to the reset position	
22	Feed bail moves to the left, moving the drive lever to the right.	
23	Drive lever extension pushes the reset lever extension out of engagement with the latch lever and it falls onto the ratchet drum, engaging a ratchet tooth.	
24	The normal stepping and counting sequence is begun again.	

656. End-of-Line Indicator Mechanism (Tape Copy)

a. The end-of-line indicator mechanism for tape copy functions to operate the end-of-line indicator lamp in the cabinet to warn the operator that the end of an equivalent page printer typed line has been reached. The mechanism consists of the end-of-line indicator switch S5 and the switch cam attached to the character counter ratchet drum. The switch circuit is operative only when the keyboard control is in the T position. In the K and K–T positions the end-of-line indicator lamp is operated by the page copy end-of-line indicator mechanism (par. 658). Selection of either the tape copy or page copy end-of-line indicator switches is controlled by the end-of-line indicator selector switch S6 (par. 658*c*).

b. As the ratchet drum of the character counter mechanism rotates, it carries the end-of-line indicator switch cam with it (fig. 394). When the end of a line is approached, a high point of the cam contacts the actuating leaf of the normally-open switch S5. As this happens, the circuit to the lamp is closed, causing it to glow. (For end-of-line indicator circuit theory see par. 711*a*). The switch cam on the ratchet drum is adjustable and can be set to operate the switch at any line length from 10 to 80 characters.

657. Keyboard-Perforator Linkage Mechanism

a. General. The keyboard-perforator linkage consists principally of a code bar extension basket mechanism and a reset cam follower bracket mechanism. The functions of the code bar extension basket mechanism are to transfer information from the keyboard code bars to the perforator, and to control the operation of the keyboard base mechanisms and the perforator in the K, K–T, and T positions. The reset cam follower arm (fig. 398) provides the linkage between the clutch trip bar and the perforator reset cam in the T position to permit tape perforation higher-than-normal speeds.

b. Operation in K Position. When the keyboard control knob is placed to the K position the linkage is set to permit signal transmission from the keyboard (pars. 646 and 647) while rendering the perforator inoperative. Positioning the keyboard control knob to the K position conditions the linkage as follows:

(1) Turning the keyboard control knob to the K position causes the blocking bail (fig. 396) to be moved to the left (dotted position) by the action of the control cam. When a code bar is selected and moves to the right, the code bar extension is prevented from moving to the right by the blocking bail and, therefore, information is not transmitted to the punch mechanism. An extension on the blocking bail blocks operation of the character counter code bars (par. 655).

(2) As the blocking bail moves to the left a second extension (fig. 397) engages a bell crank and pivots it clockwise

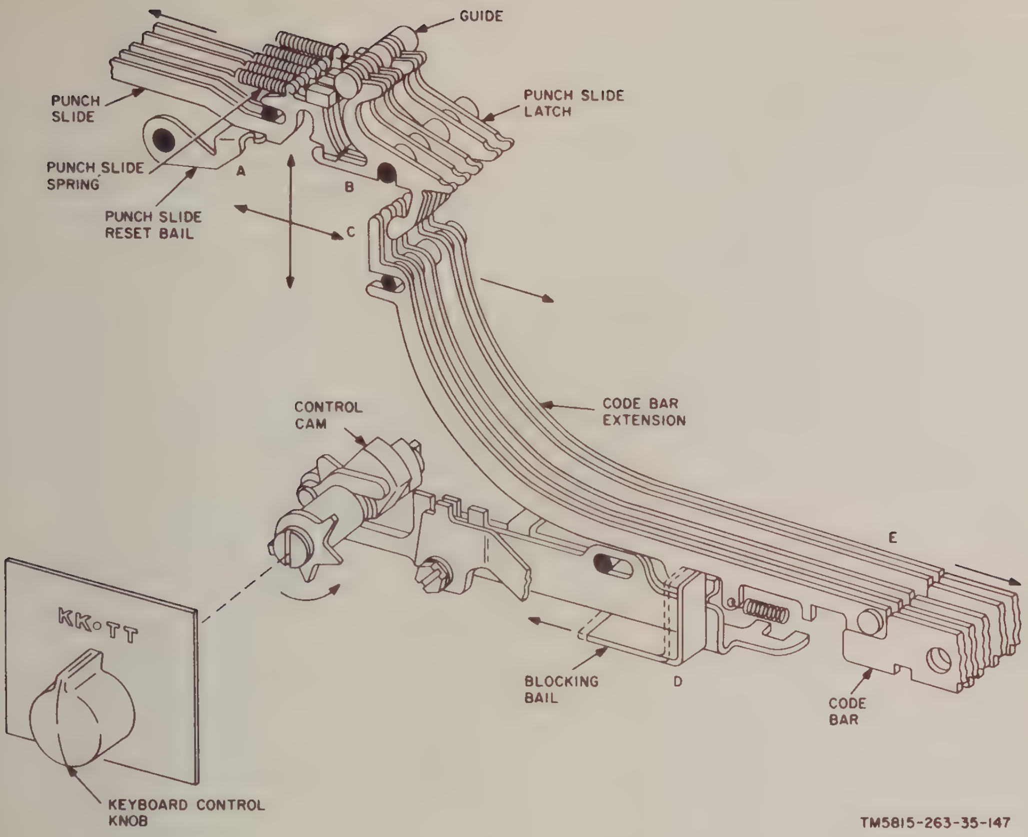

GUIDE
PUNCH SLIDE
PUNCH SLIDE LATCH
PUNCH SLIDE SPRING
A
B
PUNCH SLIDE RESET BAIL
C
CODE BAR EXTENSION
CONTROL CAM
E
KK∘TT
BLOCKING BAIL
D
CODE BAR
KEYBOARD CONTROL KNOB
TM5815-263-35-147

Figure 396. Code bar extension basket, front right view.

This disengages the latch from the clutch trip bar link so that, as the clutch trip bar moves to the right, the clutch trip bar link remains in the position shown and the perforated clutch cannot be tripped.

(3) The keyboard control selection lever (fig. 398) is pivoted counterclockwise so that its pin at point B is free of the hook on the reset lever of the reset cam follower mechanism. At the same time, the extension on the right end of the keyboard control selection lever moves up to the dotted position shown at point C so that, as the clutch trip bar falls to the right, the extension strikes the signal generator clutch trip lever, operating the signal generator mechanism.

c. Operation in K–T Position. In this position the linkage is arranged to permit signal transmission from the keyboard together with tape preparation. Setting the keyboard control to the K–T position conditions the keyboard linkage as follows:

(1) When the keyboard control knob is moved to the K–T position, the blocking bail (fig. 396) moves to the right, releasing the code bar extensions and character counter code bars. The bell crank (fig. 397) pivots counterclockwise, allowing the latch to engage the clutch trip bar.

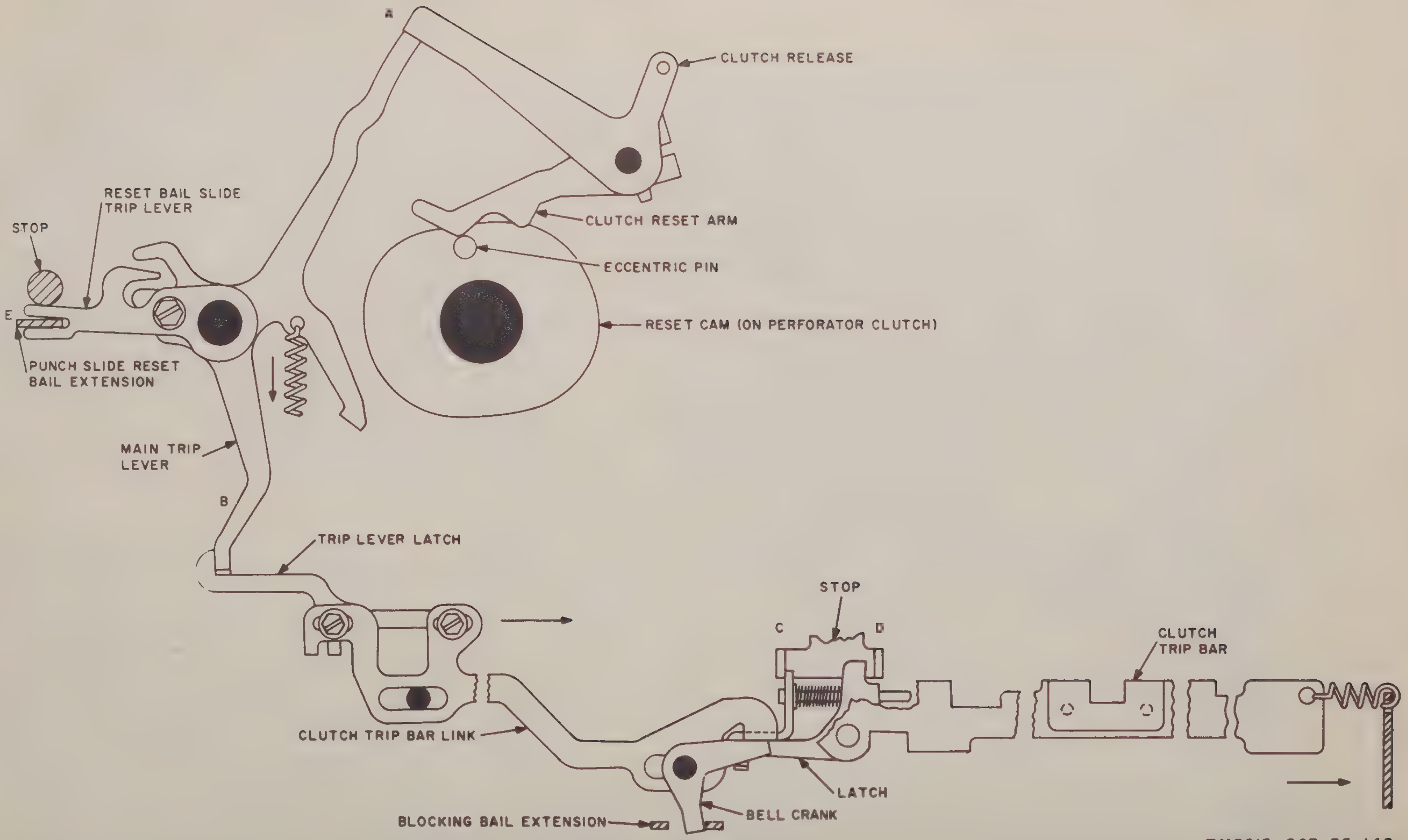

A
CLUTCH RELEASE
RESET BAIL SLIDE TRIP LEVER
STOP
CLUTCH RESET ARM
ECCENTRIC PIN
E
RESET CAM (ON PERFORATOR CLUTCH)
PUNCH SLIDE RESET BAIL EXTENSION
MAIN TRIP LEVER
B
TRIP LEVER LATCH
STOP
C
D
CLUTCH TRIP BAR
CLUTCH TRIP BAR LINK
LATCH
BELL CRANK
BLOCKING BAIL EXTENSION
TM5815-263-35-148

Figure 397. Keyboard-perforator linkage, K or K-T position, front view.

(2) The keyboard control selection lever (fig. 398) remains in the counterclockwise position so that it is not engaged by the reset lever of the reset cam follower arm but is still in position to trip the signal generator clutch trip lever.

(3) The character counter code bars are released so that the character counter becomes operable. However, the end-of-line indicator mechanism for tape copy is kept inoperative due to the position of the end-of-line indicator selector switch S6 (par. 711*a*).

(4) When a code keylever is depressed during K–T operation, the clutch trip bar falls and the following sequence takes place:

(*a*) The code bar reset bail and the clutch trip bar move to the right, thereby releasing the selected code bars. The selected code bars and the associated code bar extensions (fig. 396) move to the right. As the code bar extensions move to the right, they engage their associated punch slide latches at point C, causing the punch slide latches to rotate counterclockwise and unlock the punch slides at point B.

(*b*) The clutch trip bar link (fig. 397) is pulled to the right by the clutch trip bar. The clutch trip bar link is coupled to the trip lever latch. This latch contacts the main trip lever at point B, causing it to rotate counterclockwise. As this occurs, the main trip lever becomes disengaged from the clutch release at point A. The clutch release falls under spring tension and releases the main trip lever which, in turn, trips the perforator clutch. The signal generator clutch is tripped as previously described (par. 647).

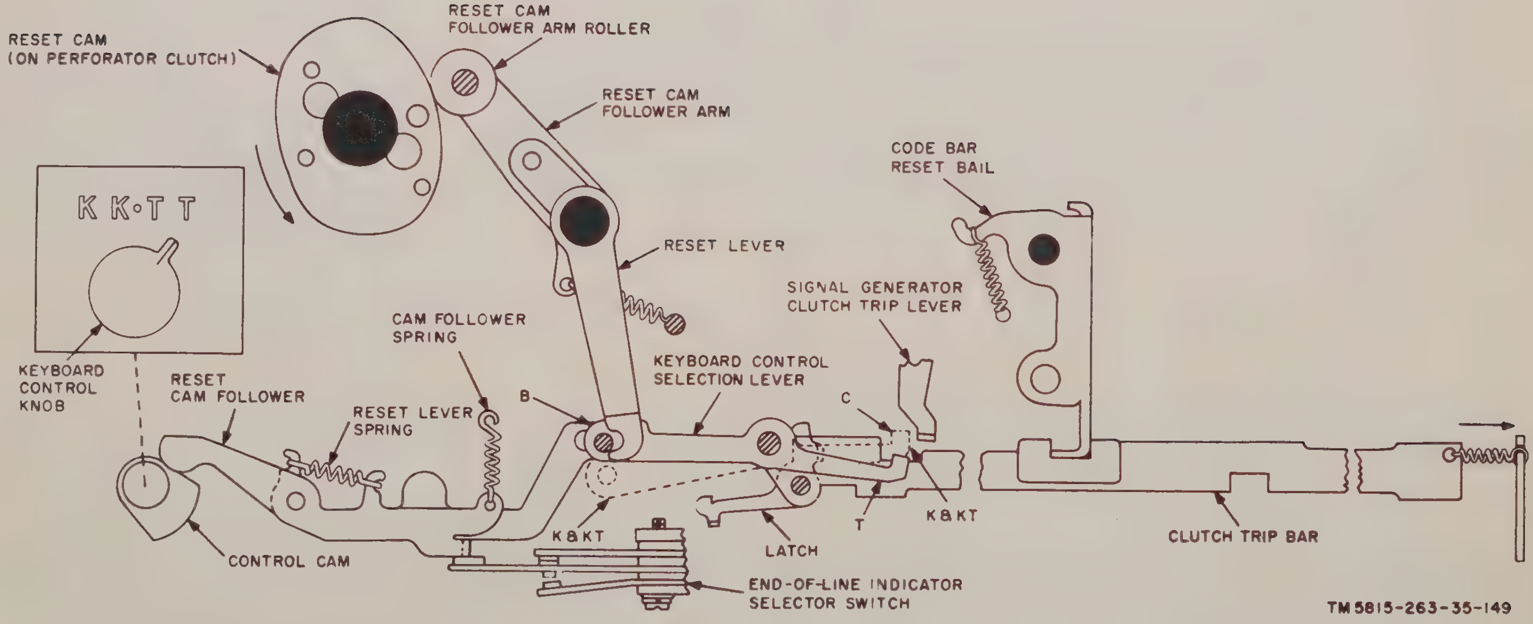
(*c*) As the main trip lever rotates counterclockwise, the reset bail slide trip lever linked to it (fig. 397) pulls down a punch slide reset bail extension at point E. The reset bail then moves down, permitting the selected punch slides (fig. 396) to move to the left under the action of their punch slide springs.

(*d*) As the clutch trip bar nears the end of its stroke to the right (fig. 397), the upper portion of the latch comes in contact with the stop at point D. The latch then pivots counterclockwise, releasing the clutch trip bar link which moves rapidly to the left under the action of the compression spring immediately below the stop. The clutch trip bar link is stopped in its movement to the left by its extension striking the stop at point C. The trip lever latch is to the left of and completely free of the main trip lever. As the clutch release pivots clockwise under the resulting action of the eccentric pin on the reset cam, the main trip lever is released from its counterclockwise position and allowed to rotate clockwise to its normal position as shown in figure 397.

(*e*) In the meantime, the clutch trip bar (fig. 397) is being reset and is moving to the left. As the latch moves to the left away from the stop at point D, it pivots clockwise to its normal position so that when the clutch trip bar is at the extreme left of its reset travel, the latch is again allowed to hook under the clutch trip bar link. This completes the operating cycle.

d. Operation in T Position. When the keyboard control is placed to the T position, tape can be perforated by the perforator but no signals are transmitted by the keyboard. The keyboard is reset by the perforator since the signal generator mechanism is disabled. Setting the keyboard control knob to the T position conditions the linkage as follows:

(1) When the keyboard control knob is turned to the T position, the keyboard control selection lever (fig. 398) is pivoted clockwise so that its pin at point B is in position to engage the hook of the reset cam follower reset lever. The right end of the keyboard



RESET CAM (ON PERFORATOR CLUTCH)
RESET CAM FOLLOWER ARM ROLLER
RESET CAM FOLLOWER ARM
CODE BAR RESET BAIL
K K·T T
RESET LEVER
SIGNAL GENERATOR CLUTCH TRIP LEVER
CAM FOLLOWER SPRING
KEYBOARD CONTROL SELECTION LEVER
KEYBOARD CONTROL KNOB
RESET CAM FOLLOWER
B
C
RESET LEVER SPRING
K & KT
T
K & KT
LATCH
CLUTCH TRIP BAR
CONTROL CAM
END-OF-LINE INDICATOR SELECTOR SWITCH
TM 5815-263-35-149

Figure 398. Keyboard-perforator linkage, T position, front view.

control selection lever at point C falls so that it will not engage the signal generator clutch trip lever. In the T position, therefore, the keyboard signal generator is inoperative.

(2) The keyboard perforator linkage and perforator clutch trip system operate as described in *c* above. The character counter is operative and the tape copy end-of-line indicator functions.

(3) Code bar reset is effected by the reset cam follower mechanism. When a code keylever on the keyboard is depressed, the code bar reset bail and clutch trip bar (fig. 398) fall to the right so that the reset lever with hook is in position to engage the pin of the keyboard control selection lever at point B. When the perforator clutch is tripped, the reset cam begins to rotate counterclockwise and, as it does, the reset cam follower arm and associated reset lever rotate clockwise. The hook on the reset lever engages the pin on the keyboard control selection lever and moves the selection lever and clutch trip bar to the left. The configuration of the reset cam is such that, at a later stage of the operating cycle, the reset lever with hook moves away from the pin of the keyboard control selection lever. The clutch trip bar again starts to move to the right. However, the eode bar bail latch latches the code bar reset bail at this point, preventing further movement of the clutch trip bar as the reset cam follower arm returns to its initial position.

658. Keyboard-Perforator Linkage Switches

a. General. The keyboard-perforator linkage is equipped with two selector switches: the keyboard control switch S4 and the end-of-line indicator selector switch S6. They provide a means of routing the equipment circuitry so that appropriate components or parts are energized in the various modes of operation (K, K–T, or T).

b. Keyboard Control Switch. The keyboard control switch S4 consists of a rotary wafer switch geared to a shift on the rear of the keyboard control cam. It operates or its position is changed as the keyboard control position is changed. The purpose of the keyboard control switch is to route ac power to the clutch trip magnets of the transmitter distributor when the control knob is placed to the K–T or T position. In the K position, the switch disconnects power from the clutch trip magnets. (Refer to par. 711*e* for electrical theory.)

c. End-of-Line Indicator Selector Switch S6. The end-of-line indicator selector switch S6 consists of a leaf-type switch mounted on the underside of the keyboard-perforator linkage section of the keyboard base (fig. 398). It is operated by the action of the control cam through the reset cam follower arm. When the keyboard control is in the K or K–T position, the end-of-line indicator selector switch routes circuitry so that the end-of-line indicator switch S9 (page copy) (par. 689) operates the end-of-line indicator lamp on the cabinet. When the keyboard control is in the T position, circuitry is routed so that the end-of-line indicator switch S5 (tape copy) (par. 656) controls the end-of line indicator lamp. (Refer to par. 711*a* for electrical theory).

659. Perforator Outline of Operation

The perforator unit provides a means of producing a typewritten and perforated tape. It is located on the left front edge of the keyboard base and is mechanically connected (as selected by the keyboard control) to the keyboard code bar mechanism through the keyboard perforator linkage. The linkage is so arranged that when keyboard control is placed to the K position (par. 657*b*) the perforator is disabled. In the K–T position of the linkage (par. 657*c*), the perforator prepares a tape of the message being sent from the keyboard; and in the T position of the linkage (par. 657*d*) it prepares a tape separately from any other operation, as an off-line procedure. When placed in operation (K–T or T), the general functions of the perforator are as follows:

a. Punch slides are positioned by the manual operation of the keylevers through the keyboard-perforator linkage (code bar extension basket). A clutch trip mechanism, operated by the clutch trip code bar, controls the application of rotary motion to the punch and positioning mechanisms.

b. The punch slides distribute intelligence from the keyboard, in the form of mechanical arrangements, to the punch block and transfer mechanism. The transfer mechanism, in turn, carries the information to the function box and the axial and rotary positioning mechanisms. At the receipt of the letters or figures code combination, the function box causes the rotary positioning mechanism to shift the typewheel to the upper or lower case characters. The positioning mechanisms (axial and rotary), in conjunction with the correcting mechanism, position the typewheel so that the proper characters are selected. The ribbon mechanism supplies the ink, and the printing mechanism provides the necessary impact to imprint the selected character on the tape.

c. The main bail assembly, driven by the rocker bail, imparts motion to the tape feed parts and the punch slides. The tape feed parts punch feed holes into the tape and advance it for printing and punching of the next character. The punch slides, having received the intelligence from the code bar extensions, cause punch pins in the punch block to perforate combinations of holes corresponding to the code combinations. A power driven backspace mechanism provides a method of repositioning tape in the punch block for correcting errors.

660. Motion for Typing and Perforating

a. *General*. As was described in paragraph 644, rotary motion is applied to the perforator main shaft at all times when the main motor is operating. The perforator main shaft rotates at a constant speed and, since no synchronism is required, the perforator can accommodate any rate of input from the keyboard, up to 150 words per minute. The motion imparted by the main shaft is distributed to the mechanisms concerned with typing and perforation by the function mechanism which is comprised of the function cam-clutch and clutch trip assembly (fig. 399), and the rocker bail assembly (fig. 400).

b. *Function Cam-Clutch and Clutch Trip Assembly*.

(1) As a keylever on the keyboard is depressed, the trip lever latch and clutch trip bar link in the keyboard-perforator linkage (fig. 397) transmit the motion of the clutch trip bar (in the keyboard code bar mechanism), as described in paragraph 657*c*(4)(*b*), to rotate the main trip lever (fig. 399) in a clockwise direction, this in turn causes the reset bail trip lever to move downward, lowering the reset bail and releasing the punch slides. At the same time, the upper arm of the main trip lever moves to the left and away from the clutch release. As this happens, the clutch release falls against the release down stop bracket and rotates the trip shaft counterclockwise. Immediately, the trip lever latch (fig. 397) allows the main trip lever (fig. 399) to return toward its unoperated position, with the upper arm moving down against the clutch release. When the trip shaft is rotated by the clutch release, it moves the trip lever out of engagement with the clutch shoe lever. The function clutch engages (par. 645) and the perforator main shaft rotates to begin the operating cycle.

(2) About midway through the cycle, an eccentric pin on the function cam lifts the reset arm, which rotates the trip shaft clockwise. The clutch release is moved upward, allowing the main trip lever to rotate fully clockwise, raising the reset bail. The eccentric pin then moves out from under the reset arm, and the clutch release is permitted to return to its unoperated position against the main trip lever. When the function cam-clutch assembly completes its cycle, the clutch shoe lever strikes the trip lever and the clutch becomes disengaged.

c. *Rocker Bail Assembly*.

(1) The rocker bail assembly distributes motion from the function cam-clutch assembly to the following:

(*a*) Punch mechanism (par. 662).

(*b*) Push bars of the positioning mechanisms (pars. 664 and 665).

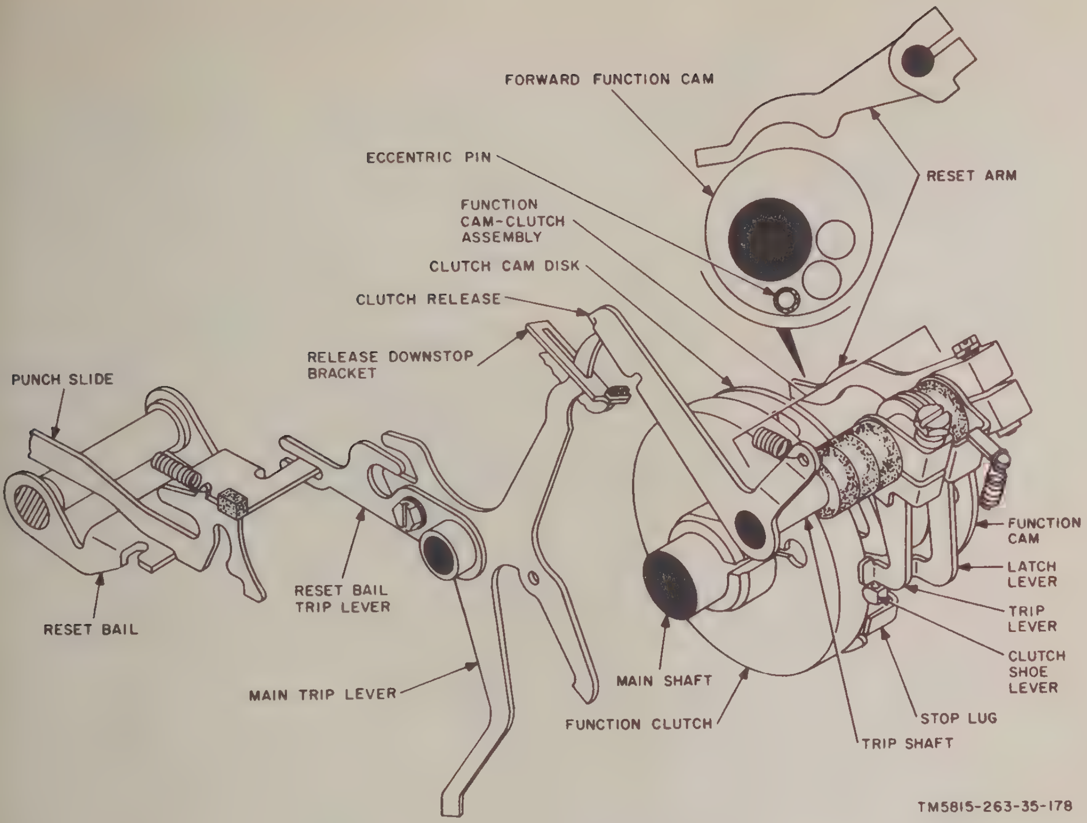

FORWARD FUNCTION CAM
ECCENTRIC PIN
RESET ARM
FUNCTION CAM-CLUTCH ASSEMBLY
CLUTCH CAM DISK
CLUTCH RELEASE
RELEASE DOWNSTOP BRACKET
PUNCH SLIDE
FUNCTION CAM
LATCH LEVER
TRIP LEVER
CLUTCH SHOE LEVER
RESET BAIL TRIP LEVER
RESET BAIL
MAIN SHAFT
MAIN TRIP LEVER
FUNCTION CLUTCH
STOP LUG
TRIP SHAFT
TM5815-263-35-178

Figure 399. Perforator function cam-clutch and clutch trip assembly.

(*c*) Correcting mechanism (par. 666).

(*d*) Letters-figures shift mechanism (par. 667).

(*e*) Printing mechanism (par. 668).

(*f*) Ribbon mechanism (par. 669).

(2) The rocker bail is shown in its home position in figure 400. During each function cycle the function cam of the main shaft bears against the upper and lower rollers of the rocker bail and cause the bail to move first to the left (as viewed from the front of fig. 400) during the first part of the cycle, and then back to the home position during the latter part of the cycle.

d. Sequence Chart. The following chart lists the sequence of operations described in *b* and *c* above.

Perforator Motion Distribution Sequence Chart

1	Keylever is depressed	
2	Clutch trip bar moves to the right, moving the clutch trip bar link and trip lever latch.	
3	Trip lever latch rotates the main trip lever clockwise.	
4	Upper arm of the main trip lever moves to the left and frees the clutch release.	Reset bail trip lever releases the reset bail and punch slides (par. 662).
5	Clutch release falls against the release downstop bracket and rotates the trip shaft counterclockwise.	
6	Trip lever moves away from the clutch shoe lever.	
7	Function clutch engages and the main shaft rotates.	
8	Function cam moves the rocker bail to the left	
9	Rocker bail applies motion to the various parts until the halfway point of main shaft rotation.	
10	Eccentric pin on the function cam lifts the reset arm which ro-	Function cam starts the rocker bail moving to the right to-

Perforator Motion Distribution Sequence Chart—Continued

	tates the trip shaft clockwise.	ward the home position.
11	Clutch release is moved upward to its unoperated position, allowing the main trip lever to move fully clockwise.	Rocker bail continues moving toward home position.
12	Clutch shoe lever strikes the clutch trip lever.	Rocker bail arrives at home position.
13	Clutch disengages.	

Note: It is at this point that the sequence starting with 1 above can begin for the next character.

661. Transfer Mechanism

a. The transfer mechanism functions, at the end of each keyboard selecting cycle, to pass the input intelligence sent from the keyboard, from the punch slides to the function box (par. 667), and the positioning mechanisms (pars. 664 and 665). The transfer mechanism consists of five sets of mechanical linkages, each of which is associated with a punch slide. A linkage consists of a transfer lever, a pulse beam, and a bell crank. Since all linkages are similar, the number 4 linkage shown in figure 401 is representative of all five linkages.

b. The linkages associated with the unselected punch slides (par. 657*c*) remain in their unselected position, as shown in figure 401. However, the selected slides move to the left, and in so doing, pivot the associated transfer levers, which in turn move corresponding pulse beams clockwise (as viewed from above).

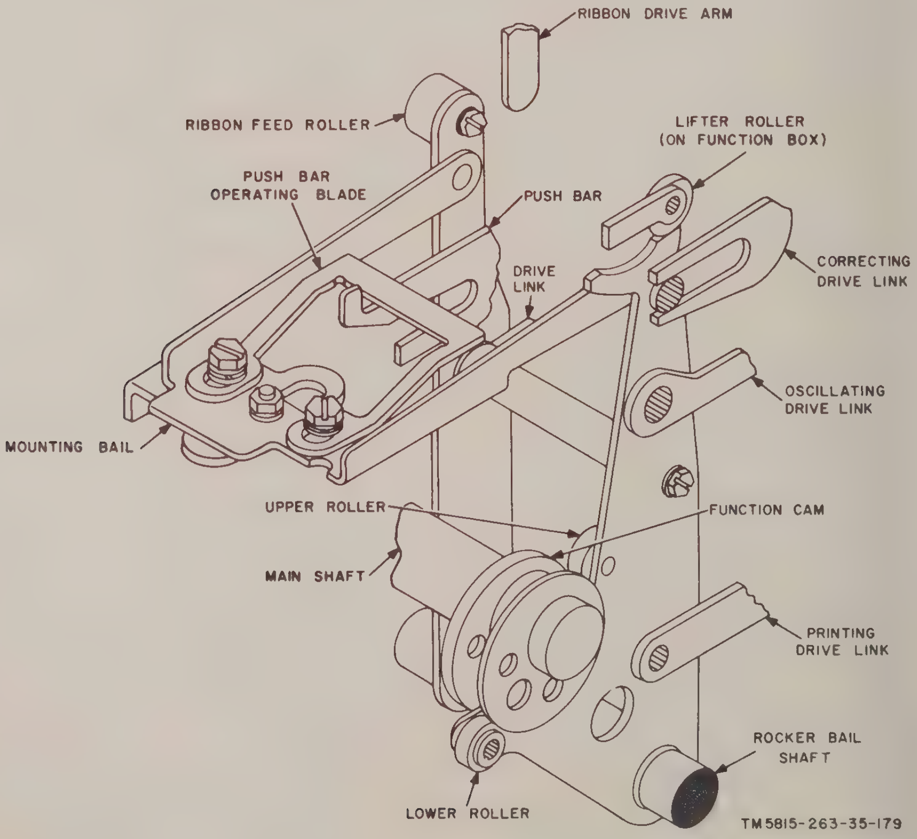

RIBBON DRIVE ARM
RIBBON FEED ROLLER
LIFTER ROLLER (ON FUNCTION BOX)
PUSH BAR OPERATING BLADE
PUSH BAR
DRIVE LINK
CORRECTING DRIVE LINK
OSCILLATING DRIVE LINK
MOUNTING BAIL
UPPER ROLLER
FUNCTION CAM
MAIN SHAFT
PRINTING DRIVE LINK
ROCKER BAIL SHAFT
LOWER ROLLER
TM5815-263-35-179

Figure 400. Rocker bail assembly, rear view.

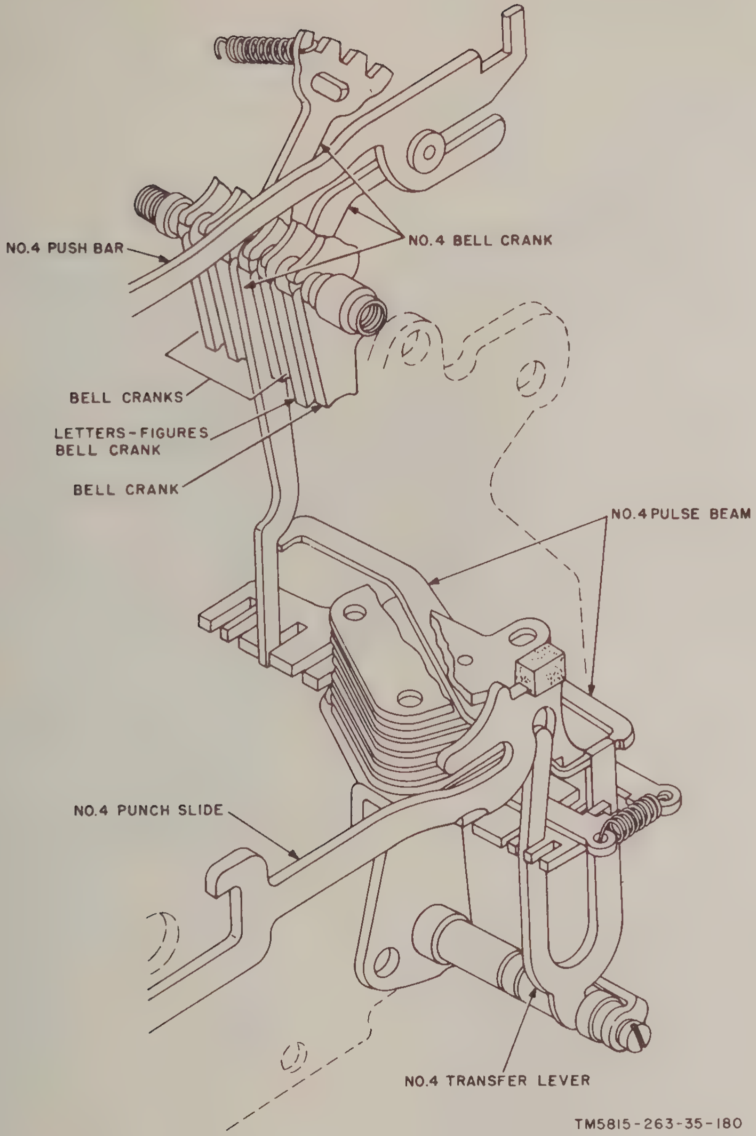

NO.4 PUSH BAR
NO.4 BELL CRANK
BELL CRANKS
LETTERS-FIGURES BELL CRANK
BELL CRANK
NO.4 PULSE BEAM
NO.4 PUNCH SLIDE
NO.4 TRANSFER LEVER
TM5815-263-35-180

Figure 401. Transfer mechanism.

The selected beams allow associated bell cranks, under their spring tension, to pivot counterclockwise, and lift attached push bars. The push bars control the positioning mechanism. In the period of the last half of the function cycle, the selected punch slides are moved back to the right and return the linkages to their unselected positions. An additional bell crank, not associated with a transfer linkage, is specifically concerned with the letters-figures shift function (par. 667).

c. The following sequence chart lists the operations for the transfer mechanism.

Transfer Mechanism Sequence Chart

1	Selected punch slides move to the left and pivot the associated transfer levers.	Unselected slides remain in their at-rest position.
2	Selected transfer levers move the corresponding pulse beams.	
3	Selected pulse beams move away from the associated bell cranks.	
4	Selected bell cranks pivot under spring tension and lift the attached pushbars.	
Note.	As this occurs, the first half of the cycle has been completed.	
5	During the last half of the cycle, the procedure outlined in steps 1 through 4 are reversed and the parts that have been activated are returned to their unselected positions.	

662. Punch Mechanism

a. General. The punch mechanism punches feed holes, advances the tape, and perforates combinations of chadless code holes corresponding to the code combinations received from the keyboard. Intelligence is received from the keyboard-perforator linkage by the punch slides, which select proper punch pins in the punch block (fig. 402). Motion from the rocker bail (par. 660) is distributed to the punch pins and the tape feeding parts by the main bail assembly which includes a toggle bail, a toggle shaft, a slide post, toggle links, drag links, and the punch slide reset bail.

b. Perforating.

(1) As described in paragraph 660*b*(1), the reset bail is lowered at the end of each keyboard selecting cycle and releases the five punch slides (fig. 402). The selected punch slides move to the left and the unselected slides are retained toward the right by their punch slide latches. In the selected position, a projection on each slide extends over the slide post. During the first part of the function cycle, the rocker bail moves to the left, and, by means of the drive link and rocker arm, rotates the toggle shaft and toggle bail counterclockwise. Toggle links attached to the front and rear of the toggle bail lift the slide post and move the reset bail to the left. The selected punch slides are carried upward by the slide post and force the associated punch pins through the tape. The punch slides pivot about the same point as the drag links, and thus become an integral part of the main bail assembly during the perforating stroke. A retractor bail, which engages notches in the punch pins, is pivoted clockwise as the punch pins move up through the tape. Approximately midway through the function cycle, the function clutch trip assembly lifts the reset bail as described in paragraph 660*b*(2).

(2) During the last half of the cycle, the toggle bail is rotated clockwise and lowers the punch slides. The reset bail, moved to the right by the toggle links, drives the punch slides back to the unselected position where it holds them until the next operation. The retractor bail, under spring pressure, holds the punch pins down against the punch slides until the punch pins are retracted below the tape. The notches in the punch pins are long enough to allow the retractor bail to pivot its full amount without lifting the unselected punch pins against the tape, but are short enough to permit the retractor bail to serve as a downstop for the punch pins and thus hold them in the punch block. A compression spring is mounted on the number punch pin, and four tension springs are hooked to the slide post and the retractor bail. The main bail assembly, the retractor bail, and the selected punch slides and punch pins move as a unit during the perforating stroke, while the retractor bail tension springs are not part of the load on the toggle bail shaft. The openings in the punch block above the tape through which the selected punch pins protrude are semicircular so that only the rear portion of the hole is severed.

c. Perforating Sequence Chart. The following sequence chart summarizes the operations for tape perforation as given in *b* above.

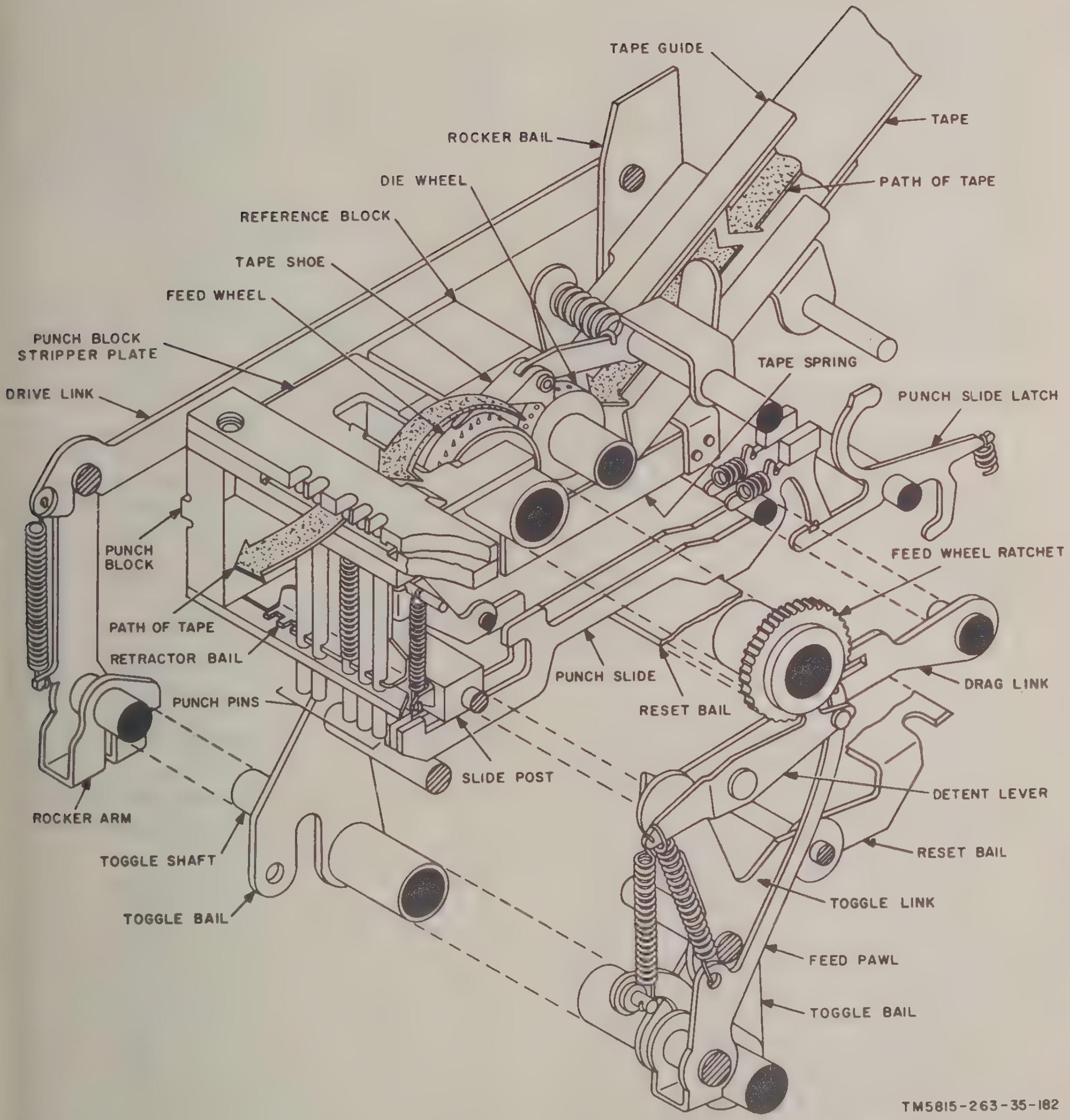

TAPE GUIDE
TAPE
ROCKER BAIL
PATH OF TAPE
DIE WHEEL
REFERENCE BLOCK
TAPE SHOE
FEED WHEEL
PUNCH BLOCK STRIPPER PLATE
DRIVE LINK
TAPE SPRING
PUNCH SLIDE LATCH
PUNCH BLOCK
FEED WHEEL RATCHET
PATH OF TAPE
RETRACTOR BAIL
PUNCH SLIDE
DRAG LINK
PUNCH PINS
RESET BAIL
SLIDE POST
DETENT LEVER
ROCKER ARM
RESET BAIL
TOGGLE SHAFT
TOGGLE LINK
TOGGLE BAIL
FEED PAWL
TOGGLE BAIL
TM5815-263-35-182

Figure 402. Punch mechanism.

Perforating Sequence Chart

1	Keylever is depressed, causing the operations given in paragraph 660*d* to occur.	
2	Reset bail releases the five punch slides.	
3	Selected punch slides move to the left.	Unselected punch slides remain latched toward the right.
4	Projections on the selected punch slides move over the slide post.	
5	Rocker bail moves to the left, moving the drive link.	
6	Drive link moves the rocker arm and attached toggle shaft.	
7	Toggle shaft moves the toggle bail and toggle links counterclockwise.	
8	Slide post moves upward, carrying the selected punch slides upward.	Reset bail moves to the left.
9	Selected punch slides strike the associated punch pins and move them upward through the tape. *Note.* As the above operation occurs, the midpoint of the function cycle has been reached. The remainder of the sequence (steps 10 through 13 below) occurs during the last half of the cycle.	
10	Rocker bail moves to the right, moving the drive link in the same direction.	
11	Drive link causes the rocker arm to rotate the toggle shaft and toggle bail clockwise.	
12	Punch slides are lowered.	Reset bail moves to the right.
13	Reset bail moves the punch slides to the right or unselected position.	Retractor bail moves the selected punch pins downward until the next sequence begins.

d. Feeding. Tape feeding is accomplished during the last of the function cycle after perforation has been completed (*c*(2) above). The tape is threaded down through the tape guide and up between the feed wheel and die wheel (fig. 402). The feed pawl, driven by the toggle bail, acts upon the feed wheel ratchet and rotates the feed wheel, which, by means of sharp pins, in the feed wheel, and holes in the die wheel, depresses feed holes in the tape and advances it one character at a time. A detent lever, with a roller that rides on the feed wheel ratchet holds the feed wheel and tape in position during perforation. The detent lever and feed pawl springs are so positioned that the pressure of the detent lever on the feed wheel ratchet is high during the first half of the cycle, so as to hold the tape in proper position during perforation, but is low during idling and the last half of the cycle, to facilitate tape threading and feeding. A tape shoe retains the tape on the feed wheel, and a tape spring holds it back against the reference block so that the feed holes are punched at a uniform distance from the edge. The tape is stripped from the feed wheel by the punch block stripper plate, passes into the punch block where it is printed and perforated, and finally emerges at the left. The tape spring, by holding the tape back against a reference surface on the punch block, maintains a uniform relationship between the code perforations and the edge of the tape.

e. Feeding Sequence Chart. The following chart lists the sequence of operations for tape feeding as described in *d* above.

Tape Feeding Sequence Chart

Note. The entire tape feeding sequence occurs during the last half of the function cycle after the tape has been perforated and the character imprinted.

1 Toggle shaft rotates clockwise, moving the toggle bail.
2 Toggle bail moves the feed pawl upward against the feed wheel ratchet.
3 Feed wheel ratchet rotates the feed wheel
4 Feed wheel pins press through the tape into the die wheel holes during rotation.
5 Tape advances the equivalent of one character

663. Typing Outline of Operation

The type faces used to imprint the intelligence (letters, figures, or symbols representing various functions) are embossed on the cylindrical surface of the typewheel (fig. 404). During the function cycle, the axial and rotary positioning mechanisms (pars. 665 and 666), having received the intelligence from the transfer mechanism, position the typewheel so that the character represented by the received code combination is selected. Following the typewheel positioning, the correcting mechanism (par. 666) accurately aligns the selected character. Then the printing mechanism (par. 669), by means of the print hammer, drives the tape and inked ribbon against the typewheel and prints the character. The ribbon mechanism (par. 670) advances the ribbon and reverses the direction of feed when one of the two spools is emptied. Near the end of the function cycle, the axial positioning mechanism retracts the typewheel and the ribbon guides so that the last printed character is visible. The letters or figures code combination sets up an arrangement in the transfer mechanism which permits the function box mechanism (par. 668) to operate and cause the rotary positioning mechanism to shift the typewheel from upper to lower case and back.

664. Typewheel Positioning

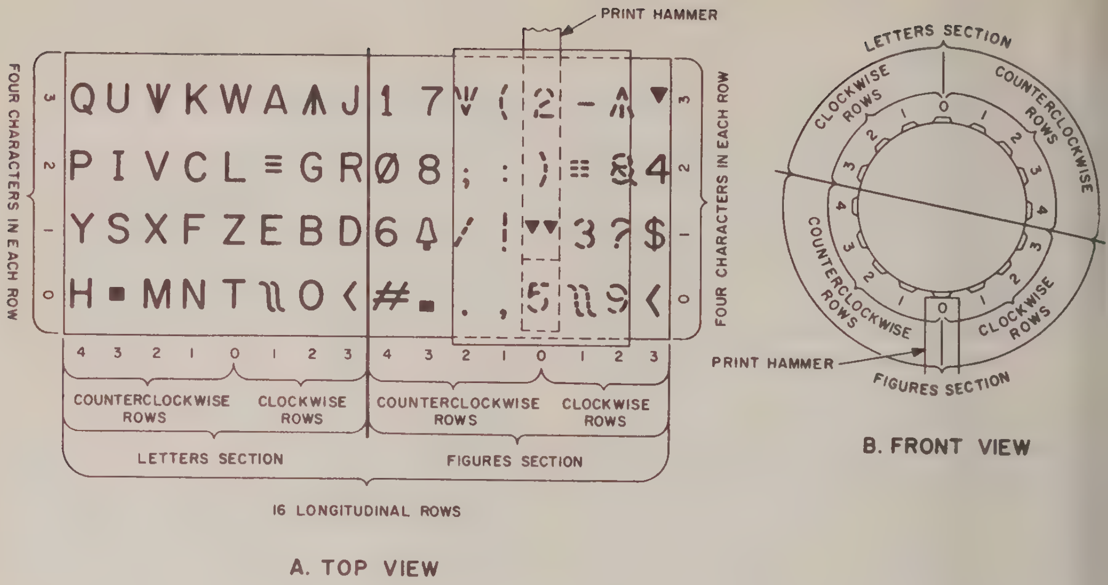
a. The typewheel character arrangement is shown in view A of figure 403, in which the cylindrical surface of the wheel is shown rolled out into a plane. There are 16 longitudinal rows of characters, each of which comprises of four characters, numbered 0 to 3 from front to rear. The surface is divided into two sections, a letters section and a figures section, each of which contains eight rows. The fifth row counterclockwise from the division line in both sections is numbered 0. There are four rows in one direction from 0, numbered 1 to 4; these are designated as counterclockwise rows. There are three rows in the opposite direction from 0, numbered 1 to 3; these are designated as clockwise rows. It must be noted that clockwise and counterclockwise, as used here, refer to the direction of rotation of the wheel to select the rows, and *not* to their position on the typewheel view B.

b. Each printing operation (except those concerned with letters or figures shift) begins and ends with the typewheel in the home position of the section containing the character to be printed, that is, with the number 0 character of the number 0 row at the point of contact of the print hammer. (Actually, since the typewheel is retracted to show the last printed character, the number 0 character is slightly to the rear, but for this discussion it will be assumed that it is at the point of contact.) During the printing operation, the axial and rotary positioning mechanisms, transferring separate but simultaneous motions to the typewheel, position it so that the character represented by the input code combination is at the point of contact of the print hammer at the time of printing. The rotary positioning mechanism, which is controlled by the number 3, 4, and 5 elements of the code, revolves the typewheel so as to select the proper row. The axial positioning mechanism, which is governed by the number 1 and 2 elements, moves the typewheel forward and rearward along its axis so as to select the proper character in the row. The letters-figures shift, which consists of rotating the typewheel eight rows from the home position of one section to that of the other, requires a separate operation of the equipment and results in the printing of a letters or figures symbol.

c. To illustrate the above, if the typewheel is in the figures condition, as shown in figure 403, and the numeral "5" is to be printed, there is no movement of the typewheel during the printing operation because "5" is already at the point of contact of the hammer. If, however, the letter "I" is to be printed, the code for letters must first be received to shift the typewheel eight rows to the letters home position. Then, during the next operation, the typewheel is rotated three rows counterclockwise and moved forward two characters, so the "I" is at the point of contact with the printing hammer. Printing takes place, and the typewheel is then returned to the letters home position.

665. Rotary Positioning Mechanism

a. General. The rotary positioning mechanism functions to rotate the typewheel so that the row containing the character to be printed is aligned with the print hammer for printing (par. 669). The mechanism is mounted on the front plate and consists of two eccentric assemblies (figs. 404 and 405). Each eccentric assembly includes a primary shaft and a secondary shaft. The primary shaft forms a pinion. The secondary shaft is mounted inside the primary shaft and is offset from its center to form an eccentric (referred to as the rear eccentric). A portion of the secondary shaft is also a pinion, and a crank pin forms a second or front eccentric. Each of the four pinions of the two eccentric assemblies is engaged by a push bar: the number 3 bar engages the right front pinion, the number 4 bar engages the left rear pinion, and the number 5 bar engages the right rear pinion. The left front pinion is engaged by both the letters and figures push bars. The eccentric drive assemblies are linked to the typewheel shaft by a typewheel drive assembly, as shown in figure 404. The typewheel is secured to the front of the typewheel shaft which is supported by a typewheel shaft housing mounted at the left rear of the front plate


PRINT HAMMER
FOUR CHARACTERS IN EACH ROW
3
2
1
0
QUVKWAAJ17V(2-A▼
PIVCL≡GRØ8;:)≡&4
YSXFZEBD6/!▼▼3?$
H■MNTOK#■.,59<
4 3 2 1 0 1 2 3 4 3 2 1 0 1 2 3
COUNTERCLOCKWISE ROWS
CLOCKWISE ROWS
COUNTERCLOCKWISE ROWS
CLOCKWISE ROWS
LETTERS SECTION
FIGURES SECTION
16 LONGITUDINAL ROWS
A. TOP VIEW
LETTERS SECTION
CLOCKWISE ROWS
COUNTERCLOCKWISE ROWS
COUNTERCLOCKWISE ROWS
CLOCKWISE ROWS
PRINT HAMMER
FIGURES SECTION
B. FRONT VIEW

SIGNAL CODE		DISPLACEMENT PRODUCED
SPACING	MARKING	
1,2	—	0 UNITS AXIAL
2	1	1 UNIT AXIAL
1	2	2 UNIT AXIAL
—	1,2	3 UNIT AXIAL
3,5	4	3 UNIT CW ROTARY
3	4,5	2 UNIT CW ROTARY
3,4,5	—	1 UNIT CW ROTARY
3,4	5	0 UNITS ROTARY
5	3,4	1 UNIT CCW ROTARY
—	3,4,5	2 UNIT CCW ROTARY
4,5	3	3 UNIT CCW ROTARY
4	3,5	4 UNIT CCW ROTARY
—	1,2,3,4,5	8 UNIT CCW ROTARY (1 TRS)
3	1,2,4,5	8 UNIT CW ROTARY (FIG)

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Figure 403. Typewheel character arrangement.

(fig. 406). A typewheel shaft spur gear, which meshes with the typewheel rack, rides on the typewheel shaft in the spur gear housing. The typewheel shaft is free to move axially in the housings and the spur gear. Flats on the typewheel shaft which bear against flats in the spur gear cause the typewheel to rotate when the spur gear rotates.

b. Rotary Positioning.

(1) When a push bar is lifted by its bell crank in response to a marking impulse (par. 661), the operating blade (figs. 400 and 405) engages a slot in the push bar and moves it to the left during the first half of the function cycle. The push bar, by means of its rack and the mating pinion, rotates the associated eccentric one half of a revolution where it is locked in position by a detent assembly while print-

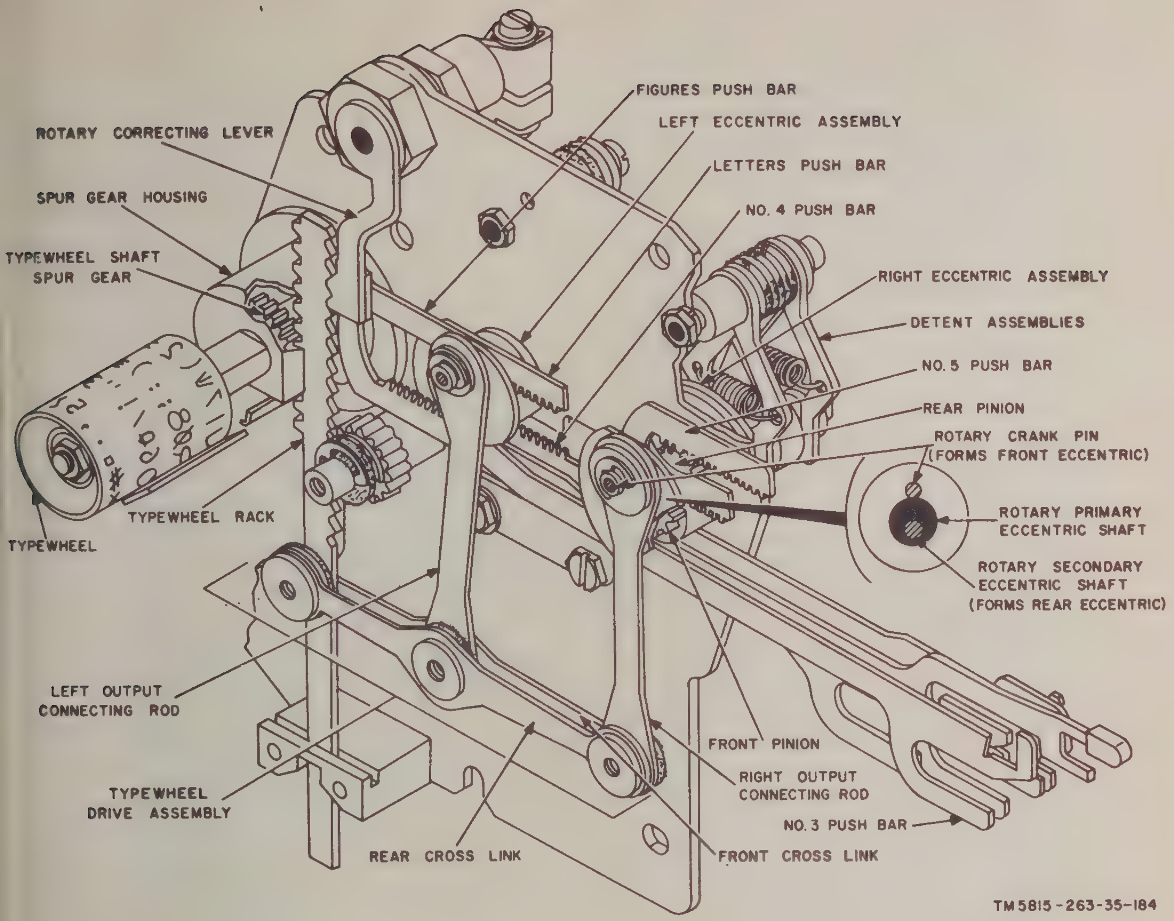
ROTARY CORRECTING LEVER
SPUR GEAR HOUSING
TYPEWHEEL SHAFT SPUR GEAR
TYPEWHEEL RACK
TYPEWHEEL
LEFT OUTPUT CONNECTING ROD
TYPEWHEEL DRIVE ASSEMBLY
REAR CROSS LINK
FIGURES PUSH BAR
LEFT ECCENTRIC ASSEMBLY
LETTERS PUSH BAR
NO. 4 PUSH BAR
RIGHT ECCENTRIC ASSEMBLY
DETENT ASSEMBLIES
NO. 5 PUSH BAR
REAR PINION
ROTARY CRANK PIN (FORMS FRONT ECCENTRIC)
ROTARY PRIMARY ECCENTRIC SHAFT
ROTARY SECONDARY ECCENTRIC SHAFT (FORMS REAR ECCENTRIC)
FRONT PINION
RIGHT OUTPUT CONNECTING ROD
NO. 3 PUSH BAR
FRONT CROSS LINK
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Figure 404. Rotary positioning mechanism.

ing takes place. When the rocker bail moves back to the right during the last half of the cycle, it returns the push bar and eccentric to their home position where the eccentric is again detented. The preceding does not apply to the number 5 push bar which is so arranged that it is selected (moved to the left) only on spacing rather than marking; nor does the preceding apply to the left-front eccentric which affects letters and figures shift, which is fully described in paragraph 668. In both assemblies, one-half revolution of the rear eccentric results in its maximum vertical displacement which is transferred through the front eccentric to a crank pin. Similarly one-half revolution of the front eccentric results in its maximum displacement being transferred to the crank pin. If both eccentrics are rotated, the displacement of the crank pin is equal to the algebraic sum of the two displacements, which may be in the same or opposite directions. Both assemblies are so designed that, if the displacement of the rear eccentric is taken to be one unit, the displacement of the front eccentric is four units. Four permutations (changes in position) are thus available: zero (neither eccentric displaced), one (rear eccentric displaced), four (front eccentric displaced), and three or five units, depending on how the assembly is set up (both eccentrics displaced).

(2) In the right eccentric assembly, the home position of the rear eccentric is down, and in the home position the front eccentric is up. Thus, their displacements are in opposite directions (up for the front and down for the rear), and their aggregate displacement is three units downward. Any displacement occurring in the right eccentric assembly is imparted to the typewheel rack in equal quantity, but in opposite direction. For example, if the number 5 push bar is selected, it causes the right rear eccentric to be displaced, and one unit of upward motion is transferred through the right output connecting rod to the right end of the cross links (fig. 404). The cross links pivot about the left output connecting rod and, as its left end, imparts one unit of downward displacement to the typewheel rack. The typewheel rack rotates the typewheel shaft spur gear, typewheel shaft, and typewheel one row of characters clockwise from the home position, and the number 1 clockwise row (fig. 403) is positioned above the print hammer at the time of printing. On the right (return) stroke of the rocker bail, the number 5 push bar returns the right rear eccentric and typewheel to their home positions. In a similar manner, selection of the number 3 push bar results in a four unit downward displacement of the right front eccentric and a four-row, counterclockwise rotation of the typewheel; and a selection of both the number 3 and number 5 push bars results in a three-row, counterclockwise rotation of the typewheel.

(3) The home position of the left rear eccentric is up, and any displacement appearing in the left eccentric assembly is transferred to the typewheel rack in double quantity in the same direction. When the number 4 push bar is selected, the left rear eccentric is displaced one unit downward. This movement is passed through the left output connecting rod to the approximate mid-point of the cross links. The cross links pivot about the right output connecting rod and its left end imparts two units of downward movement to the typewheel rack which rotates the typewheel two rows clockwise from its home position.

(4) When both eccentric assemblies are displaced, the motion occurring in the typewheel rack is equal to the algebraic sum of the motions resulting from each eccentric assembly. For example, three units of upward displacement from the right eccentric assembly, and two units of downward displacement from the left eccentric assembly occur as one unit (3 — 2 = 1) of upward displacement in the typewheel rack, and a counterclockwise rotation of one row in the typewheel. If neither the number 3, 4, nor 5 push bar is selected, the rotary mechanism remains inactive, and printing takes place in the number 0 row. Excluding the left front eccentric, which is used only for the letters-figures shift (par. 668), there are eight permutations available from positioning of the other three eccentrics, making it possible to select any one of the eight rows in a given (figures or letters) section (fig. 403).

c. Sequence Chart. The following chart lists the operations, in proper sequence, for the rotary positioning mechanism.

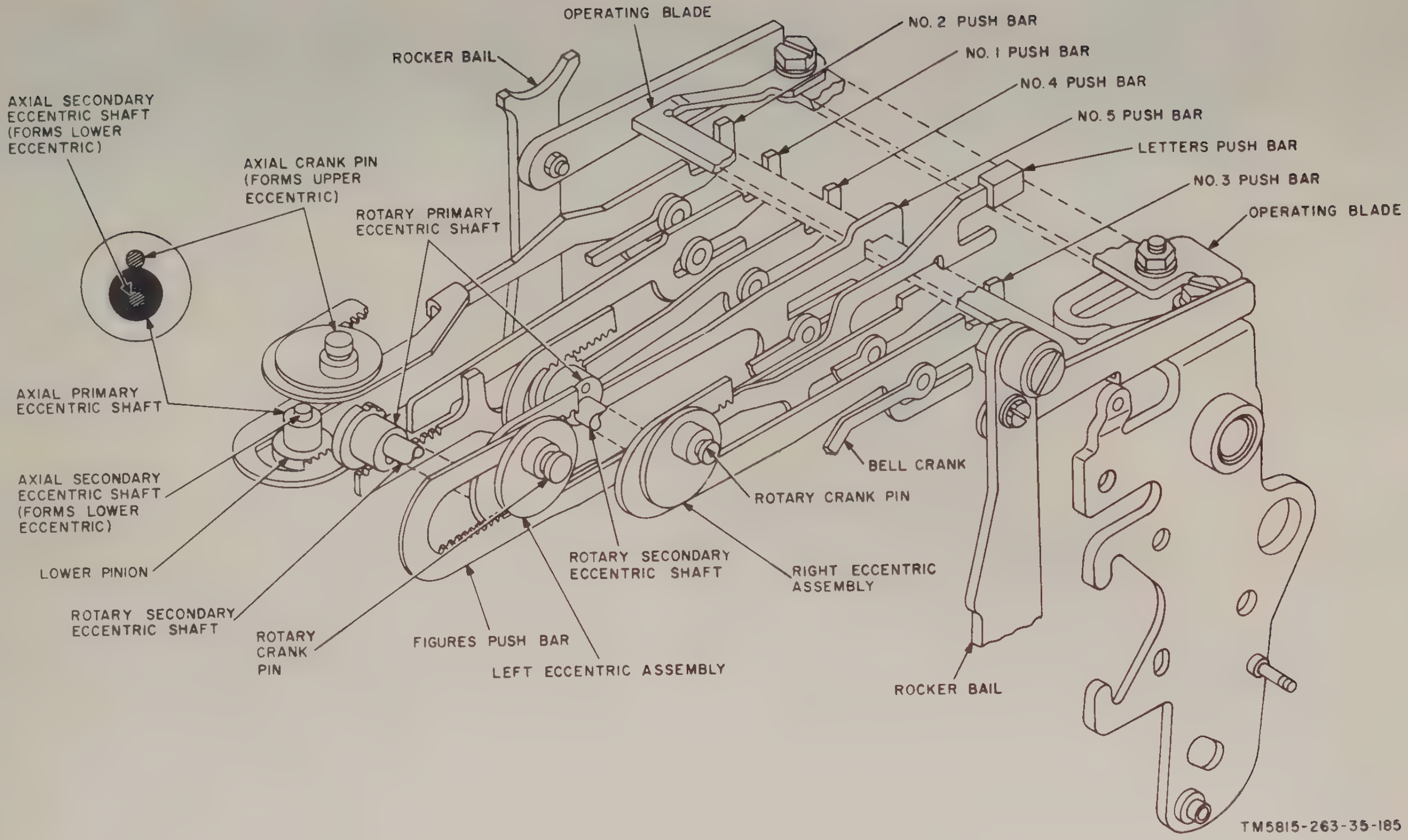
AXIAL SECONDARY ECCENTRIC SHAFT (FORMS LOWER ECCENTRIC)
AXIAL CRANK PIN (FORMS UPPER ECCENTRIC)
ROTARY PRIMARY ECCENTRIC SHAFT
ROCKER BAIL
OPERATING BLADE
NO. 2 PUSH BAR
NO. 1 PUSH BAR
NO. 4 PUSH BAR
NO. 5 PUSH BAR
LETTERS PUSH BAR
NO. 3 PUSH BAR
OPERATING BLADE
AXIAL PRIMARY ECCENTRIC SHAFT
AXIAL SECONDARY ECCENTRIC SHAFT (FORMS LOWER ECCENTRIC)
LOWER PINION
ROTARY SECONDARY ECCENTRIC SHAFT
ROTARY CRANK PIN
FIGURES PUSH BAR
LEFT ECCENTRIC ASSEMBLY
ROTARY SECONDARY ECCENTRIC SHAFT
RIGHT ECCENTRIC ASSEMBLY
ROTARY CRANK PIN
BELL CRANK
ROCKER BAIL
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Figure 405. Push bars and eccentric assemblies.

Rotary Positioning Sequence Chart

Note. The operations given in this chart occur simultaneously with those of the axial positioning mechanism (par. 666*c*).

1	Operating blade of the rocker bail moves the selected push bars (any combination of the numbers 3, 4, and 5 bars) to the left. (All push bars except the number 5 are selected by the marking condition; the number 5 push bar is selected in the spacing condition.)	Unselected push bars remain in the right position.
2	Selected push bars operate their corresponding (right or left) eccentric assemblies.	
3	Eccentric assemblies move the right and/or left output connecting rods.	
4	Output connecting rods move the cross links	
5	Cross links move the typewheel rack an amount corresponding to the algebraic sum of the motions delivered by the eccentrics.	
6	Typewheel rack rotates the typewheel shaft spur gear.	
7	Typewheel shaft spur gear rotates the typewheel to one of eight stops in the section to select a given row of characters.	
	Note. The above operations occur during the first half of the operating cycle; the steps that follow occur during the last half of the cycle. It is at this point that the correcting mechanism (par. 667*d*) locks the setting in place, and the print hammer (par. 669*c*) imprints the character on the tape.	
8	Operating blade of the rocker bail moves to the right.	
9	Selected push bars move to the right	
10	Motion of the eccentric assemblies, output connecting rods, typewheel, rack, and typewheel is reversed.	
11	Typewheel returns to the home (number 0) position of the section until the next succeeding sequence is begun.	

666. Axial Positioning Mechanism

a. General. The functions of the axial positioning mechanism are to position the typewheel so that the proper character in the selected row is aligned with the print hammer at the time of printing, and to retract the typewheel and ribbon guide at the end of the function cycle so that the last-typed character is visible. The mechanism is mounted on the axial bracket supported by the frame and the front plate, and includes an eccentric assembly similar to those of the rotary positioning mechanism (figs. 405 and 406). Two eccentrics—a lower (whose pinion is driven by the number 1 push bar) and an upper (whose pinion is driven by the number 2 push bar)—rotate in a horizontal plane within upper and lower axial bearing housings attached to the axial bracket. The eccentric assembly is linked to the typewheel shaft by an axial output rack and axial sector, as shown in figure 406.

b. Axial Positioning.

(1) The selection of either the number 1 or number 2 push bar results in the maximum displacement toward the rear of its associated eccentric. The eccentrics are so designed that, if the displacement of the lower is taken to be one unit, that of the upper is taken to be two units. Thus, four permutations are available at the axial crank pin: zero (neither eccentric displaced), one unit (lower eccentric displaced), two units (upper eccentric displaced), and three units (both eccentrics displaced).

(2) If, during a function cycle, neither push bar is selected, no motion occurs in the axial positioning mechanism with the exception of that resulting from the oscillating assembly ((3) below), and the number 0 character of the row selected (by the rotary positioning mechanism) is aligned with the print hammer at the time of printing (fig. 403). If the number 1 push bar is selected (fig. 406), it causes the lower eccentric to move, and one unit of displacement is transferred by the axial crank pin to the axial output rack. The axial output rack moves to the rear and passes the motion to the axial sector which pivots counterclockwise (as viewed from above). The right end of the axial sector, by means of a cylindrical rack on the typewheel shaft, moves the typewheel one character forward from its home position. As a result, the number 1 character is printed, and when the push bar returns to its unselected position, it also returns the axial linkage and the typewheel to their home positions. Similarly, if the number 2 push bar is selected, the number 2 character is

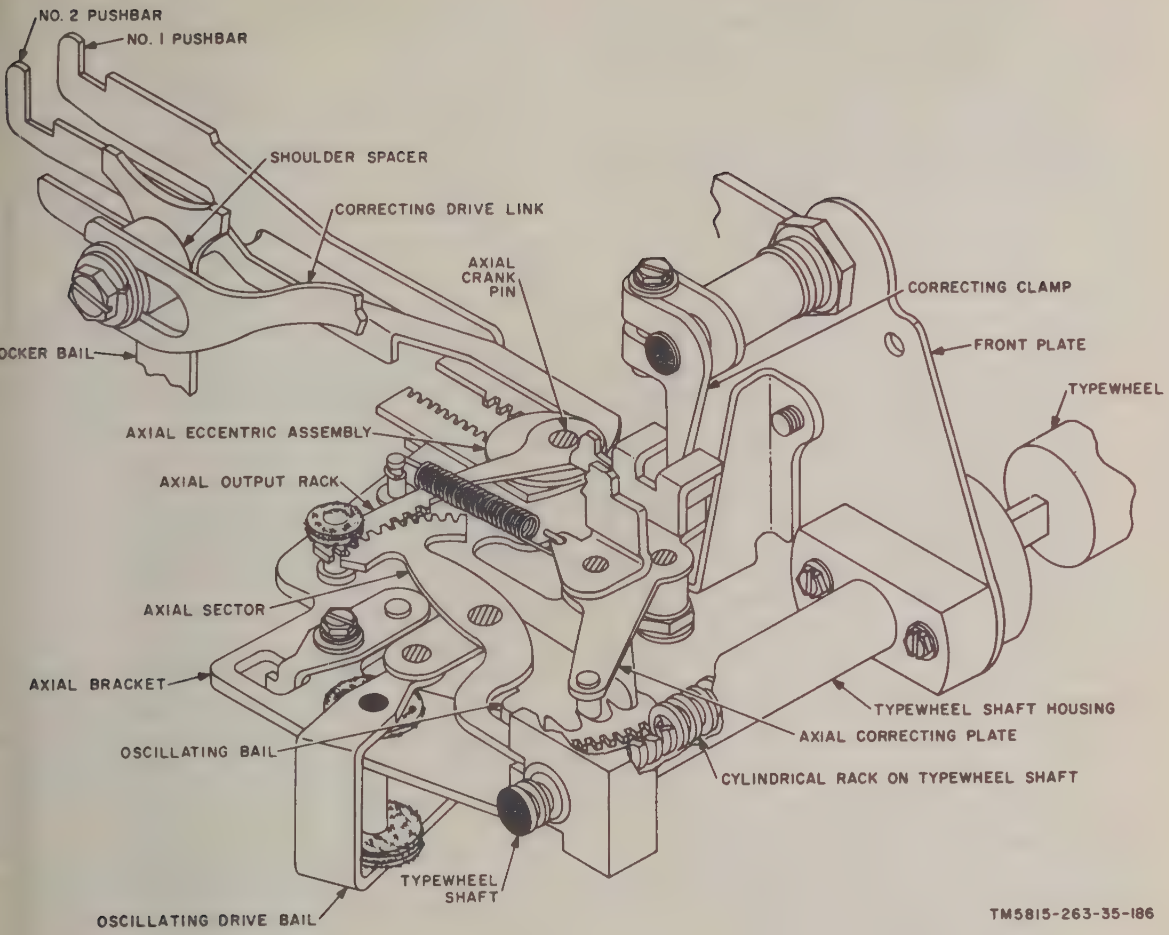
NO. 2 PUSHBAR
NO. I PUSHBAR
SHOULDER SPACER
CORRECTING DRIVE LINK
AXIAL CRANK PIN
CORRECTING CLAMP
FRONT PLATE
TYPEWHEEL
OCKER BAIL
AXIAL ECCENTRIC ASSEMBLY
AXIAL OUTPUT RACK
AXIAL SECTOR
AXIAL BRACKET
OSCILLATING BAIL
TYPEWHEEL SHAFT HOUSING
AXIAL CORRECTING PLATE
CYLINDRICAL RACK ON TYPEWHEEL SHAFT
TYPEWHEEL SHAFT
OSCILLATING DRIVE BAIL
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Figure 406. Axial positioning mechanism, rear view.

printed, and if both the number 1 and number 2 push bars are selected the number 3 character is printed. The cylindrical rack has no lead, and the shaft can thus be rotated while being moved in an axial direction.

(3) With each cycle of the function clutch, an oscillating drive link transfers motion from the rocker bail to the oscillating drive bail (figs. 406 and 408). This movement is passed by toggle links to the oscillating drive bail and the axial sector pivot. The effect of this action is to introduce a separate motion to the axial sector, tending to cause it to pivot about the teeth on the output rack. During the first half of the function cycle, if no axial push bar is selected (number 1 or number 2), the right end of the axial sector is moved forward slightly and positions the number 0 character for printing. At the end of any cycle, the axial sector retracts the typewheel slightly so that the last character printed can be viewed. At the same time the above operation occurs, the ribbon oscillat-

ing lever (fig. 408) is caused to pivot about its left end, and, with each complete cycle, project and retract the ribbon guide which otherwise would obstruct the view of the printed character.

c. Sequence Chart. The following chart lists the sequence of operations for the axial positioning mechanism (*b* above).

Axial Positioning Sequence Chart

Note. The operations listed below occur simultaneously with those of the rotary positioning mechanism (par. 665*c*).

1	Operating blade of the rocker bail moves the selected push bar (none, number 1 and/or number 2).	Oscillating bail moves the oscillating drive link.
2	Selected push bar rotates the axial eccentric assembly.	Oscillating drive link moves the oscillating drive bail.
3	Axial crank pin of the axial eccentric assembly moves the axial output rack.	Oscillating drive bail, through the attached toggle links, moves the oscillating bail.
4	Output rack rotates the axial sector.	Axial sector pivot moves to compensate for viewing clearance.
5	Axial sector moves the cylindrical rack on the typewheel shaft.	Ribbon oscillating lever rotates about its pivot point.
6	Typewheel moves forward to one of three stops to select a given character in the row set up by the rotary positioning mechanism (par. 665).	Ribbon guide projects to position ribbon directly above the print hammer.

Note. The operations listed in 1 through 6 above occur during the first half of the operating cycle; the steps that follow occur during the last half. It is at this point that the correcting mechanism (par. 667*d*) secures the setting, and the print hammer (par. 669*c*) imprints the character on the tape.

7	Rocker bail returns to its at-rest position
8	Parts moved in 1 through 6 above reverse their directions.
9	Typewheel returns to its home position and the ribbon guide retracts to permit viewing of the typed character.

667. Correcting Mechanism

a. After the typewheel has been positioned by the axial and rotary positioning mechanisms (pars. 665 and 666), the selected character is more accurately aligned for printing by the correcting mechanism which compensates for any play and backlash in the positioning linkages.

b. During each function cycle, the rocker bail transfers motion through the correcting drive link (fig. 406) to the correcting clamp and shaft. The shaft pivots the rotary correcting lever (fig. 404) which is equipped with an indentation that engages a tooth in the typewheel rack. There is one tooth in the typewheel rack for each row of characters (16 in all), and they are so correlated with the typewheel that when a tooth is engaged by the rotary correcting lever, its row is accurately aligned with the print hammer. Axial correction, which is accomplished simultaneously, is similar to rotary correction. As with rotary correction, the correcting drive link rotates an axial correcting plate counterclockwise (as viewed from the top), and the roller on the underside of the axial correcting plate engages a notch on the rear surface of the axial sector (fig. 406). Thus the typewheel is accurately aligned in both fields of motion just before printing takes place. During the latter part of the function cycle, the correcting drive link spring returns the correcting mechanism to its home position.

c. Since the rocker bail is the source of motion for both the push bars and the positioning mechanisms, corrections must take place at a point near enough to the extreme travel of the rocker bail so that it does not interfere with the movement of the typewheel rack or axial sector. In addition, because the rocker bail controls the tripping of the print hammer, which occurs very late in the rocker bail's stroke, it becomes necessary to utilize the time between the tripping of the print hammer and its striking the paper and ribbon to accomplish correction. The delay in actuating the correcting mechanism is effected by allowing the shoulder spacer on the rocker bail to slide in an elongated slot in the correcting drive link during the early part of the cycle.

d. The following chart lists the sequence of operations for the correcting mechanisms, as described in *b* and *c* above.

Correcting Mechanism Sequence Chart

Note. The operations listed below occur simultaneously with those of the rotary and axial positioning mechanisms.

1	Rocker bail moves the correcting drive link	
2	Correcting drive link moves the correcting clamp and shaft.	
3	Correcting clamp causes the axial correcting plate to rotate about its pivot point and move the rotary correcting lever.	
	Note. Just as 4 below occurs, the typewheel has reached its final position in both the rotary and axial movements, and the print hammer (par. 669) has been tripped.	
4	Axial correcting plate roller engages a notch on the rear edge of the axial sector.	Rotary correcting lever indentation engages a tooth in the typewheel rack.
5	Typewheel becomes locked in its axial position.	Typewheel becomes locked in its rotary position.
	Note. 1 through 5 above occur during the first half of the operating cycle; the steps that follow occur during the last half.	
6	Rocker bail reverses its movement and returns to home position.	
7	Parts move in 1 through 5 above reverse their direction of movement and return to home position.	

568. Letters-Figures Shift Mechanism

a. General. The letters-figures shift mechanism functions to rotate the typewheel from the home position of one section (letters or figures) (B, fig. 403) to the home position of the other section (figures or letters). Letters-figures shifting is effected by means of the function box mechanism (fig. 407) which is made up of a number of parts and assemblies mounted on two plates located at the upper rear of the perforator unit.

b. Shifting.

(1) When the typewheel is in the letters condition (figs. 404 and 407) and the figures code combination is received, the transfer mechanism sets up the figures arrangement in the bell cranks during the keyboard input portion of the cycle. Then, as the rocker bail moves from its home position during the first part of the function cycle, the lifter roller, under spring pressure, follows the camming surface on the rear arm of the rocker bail (fig. 407), and allows the letters and figures function blades to move down. As this happens, tines on the lower surface of the function blades feel for an opening in the slotted upper arms of the bell cranks.

(2) The slot arrangement of the numbers 1, 2, 4, and 5 bell cranks is identical and permits entry of both function blades when all are selected. However, on receipt of the figures code combination, the number 3 bell crank permits entry of the figures function blade, while blocking the letters blade. In moving all the way down, the figures function blade encounters a projection of the figures arm assembly, and causes the arm assemblies to shift from their letters to figures position. A yield arm extension, attached to the figures arm assembly, pivots the figures extension arm away from the letters-figures bell crank. The letters extension arm, under spring tension, rotates the letters-figures bell crank clockwise and the letters-figures bell crank lifts the letters and figures push bars. As the rocker bail reaches its extreme position, the lifter is cammed upward and raises the function blades.

(3) While the letters-figures bell crank is being positioned by the function box mechanism, the numbers 1, 2, and 4 push bars are selected, the typewheel is moved two rows clockwise and three characters forward, and the figures symbol is positioned for printing. On its return stroke, the rocker bail operating blade encounters a shoulder on the figures push bar (which was lifted as described in (2) above) and moves the figures bar to the right as viewed in figures 404 and 405. The rotary primary eccentric shaft moves the letters push bar to the left, and the crank pin shifts from its up to its down position. Since the typewheel has been displaced two rows clockwise during the first part of the cycle, it is rotated six more rows to the figures home position (see par. 665*b*(4)). As the rocker bail returns to its home position during the last half of the

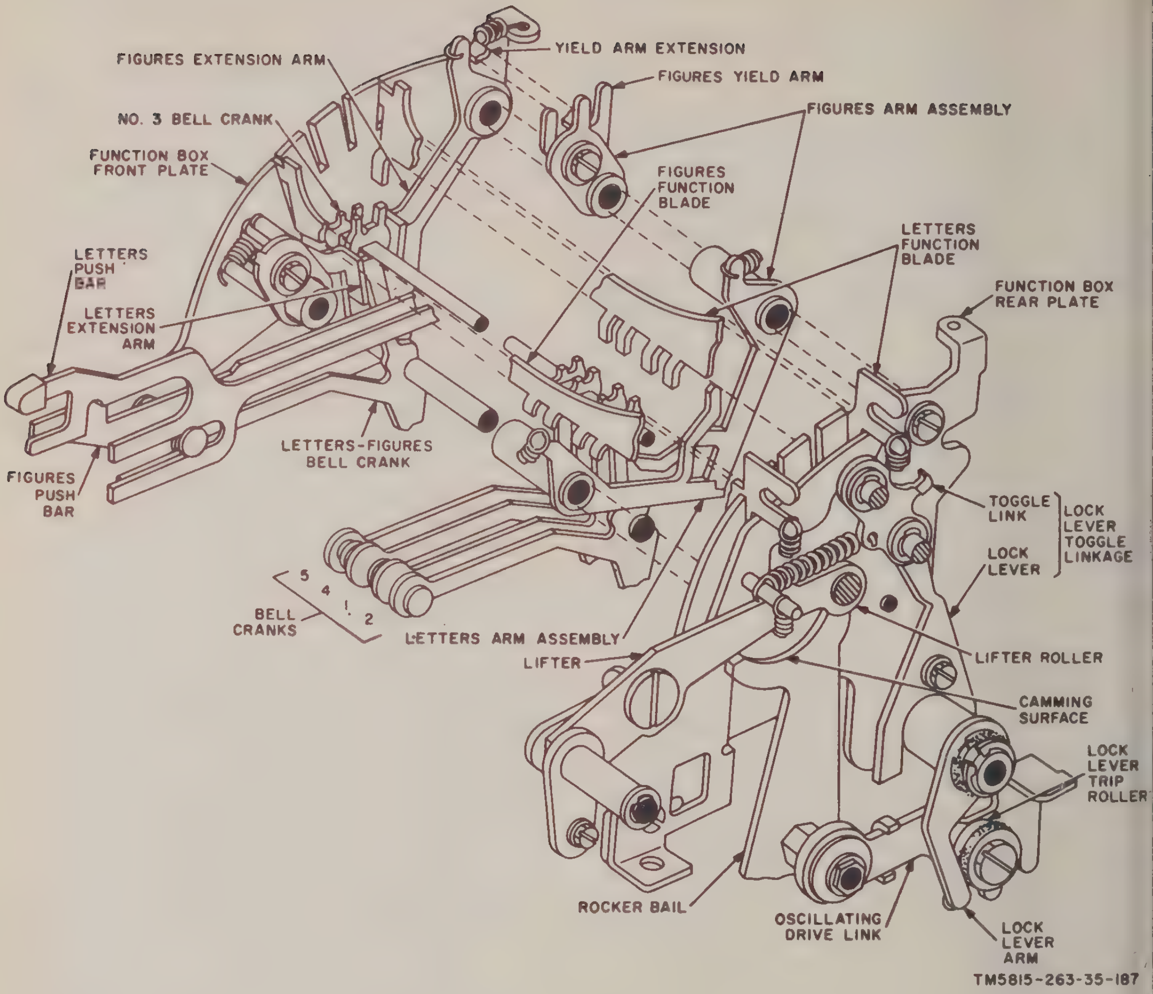
FIGURES EXTENSION ARM
YIELD ARM EXTENSION
FIGURES YIELD ARM
NO. 3 BELL CRANK
FIGURES ARM ASSEMBLY
FUNCTION BOX FRONT PLATE
FIGURES FUNCTION BLADE
LETTERS FUNCTION BLADE
LETTERS PUSH BAR
FUNCTION BOX REAR PLATE
LETTERS EXTENSION ARM
LETTERS-FIGURES BELL CRANK
FIGURES PUSH BAR
TOGGLE LINK
LOCK LEVER TOGGLE LINKAGE
LOCK LEVER
5
4
1
2
BELL CRANKS
LETTERS ARM ASSEMBLY
LIFTER
LIFTER ROLLER
CAMMING SURFACE
LOCK LEVER TRIP ROLLER
ROCKER BAIL
OSCILLATING DRIVE LINK
LOCK LEVER ARM
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Figure 407. Function box mechanism.

function cycle, a toggle link (fig. 407) prevents the lifter roller from following its camming surface, and the lifter holds the function blades up so that they do not drop onto the bell cranks. As the rocker bail nears its home position, the lock lever trip roller riding on the oscillating drive link strikes the lock lever arm. As this happens, the lock lever toggle linkage buckles and permits the lifter roller to again fall on the rocker bail camming surface.

(4) In a manner similar to that describe above, when the letters combinatio is received, the function box mechanism causes the letters-figures bel crank to lower the letters and figure push bars. The typewheel is rotate two rows counterclockwise during th first part of the cycle and six mor rows during the last part of the cycle and the letters push bar is moved t the right. The preliminary two-row rotation of the typewheel, which i made possible by selecting the numbe

5 push bar on spacing rather than on marking, provides less throw and smoother operation than would be possible if the complete eight-row displacement were effected during the latter part of the cycle. During each operation, the lifter permits the function blades to move down and feel for an opening, but except for the shift operations they are blocked by the slotted arms of the bell cranks.

c. Sequence Chart. The following sequence chart summarizes the operations that occur when the letters-figures shift mechanism is operated.

Letters-Figures Sequence Chart

Note. This chart gives the operations for shifting to either letters or figures. The (a) steps represent letters to figures shift, and the)) steps represent figures to letters shift.

1. (a) Figures code combination actuates the transfer mechanism and sets the bell cranks accordingly.		1. (b) Letters code combination actuates the transfer mechanism and sets the bell cranks accordingly.	
2. (a) Rocker bail moves from its home position, allowing the lifter roller to follow the camming surface.		2. (b) Rocker bail moves from its home position, allowing the lifter roller to follow the camming surface.	
3. (a) Lifter frees the function blades and allows them to move down against the bell cranks.		3. (b) Lifter frees the function blades and allows them to move down against the bell cranks.	
4. (a) Tines on the figures function blade permit it to move down while those on the letters blade prevent movement.		4. (b) Tines on the letters function blade permit it to move down while those on the figures blade prevent movement.	
5. (a) Figures function blade contacts the figures arm		5. (b) Letters function blade contacts the letters arm.	
6. (a) Figures yield arm extension pivots the figures extension arm away from the letters-figures bell crank.		6. (b) Letters yield arm extension pivots the letters extension arm away from the letters-figures bell crank.	
7. (a) Letters extension arm rotates the letters-figures bell crank clockwise.		7. (b) Figures extension arm rotates the letters-figures bell crank counterclockwise.	
8. (a) Letters-figures bell crank lifts the letters and figures push bars.	Typewheel becomes positioned two rows clockwise and three rows forward to print the figures symbol.	8. (b) Letters-figures bell crank depresses the letters and figures push bars.	Typewheel becomes positioned two rows counterclockwise and three rows forward to print the letters symbol.

Note. Steps 1 through 8 occur during the first half of the operating cycle; the steps that follow occur during the last half.

9. (a) Rocker bail starts its return stroke.	Toggle link locks the lifter up and away from the camming surface.	9. (b) Rocker bail starts its return stroke.	Toggle link locks the lifter up and away from the camming surface.
0. (a) Operating blade strikes the shoulder on the figures push bar.		10. (b) Operating blade strikes the shoulder on the letters push bar.	
1. (a) Figures push bar moves to the right.	Rotary primary eccentric shaft moves the letters push bar to the left.	11. (b) Letters push bar moves to the right.	Rotary primary eccentric shaft moves the figures push bar to the left.
2. (a) Crank pin shifts from the up to the down position		12. (b) Crank pin shifts from the down to the up position	
3. (a) Typewheel moves six more rows clockwise to the figures home position.	Lock lever trip roller strikes the lock lever release arm, buckling the toggle linkage so the lifter roller falls on the camming surface.	13. (b) Typewheel moves six more rows counterclockwise to the letters home position.	Lock lever trip roller strikes the lock lever release arm, buckling the toggle linkage so the lifter roller falls on the camming surface.

69. Printing Mechanism

a. After the typewheel has been positioned nd corrected, the printing mechanism supplies e impact which drives the tape and ribbon against the selected character symbol on the typewheel. This is accomplished by means of the print hammer which is mounted on the print hammer eccentric shaft supported by the

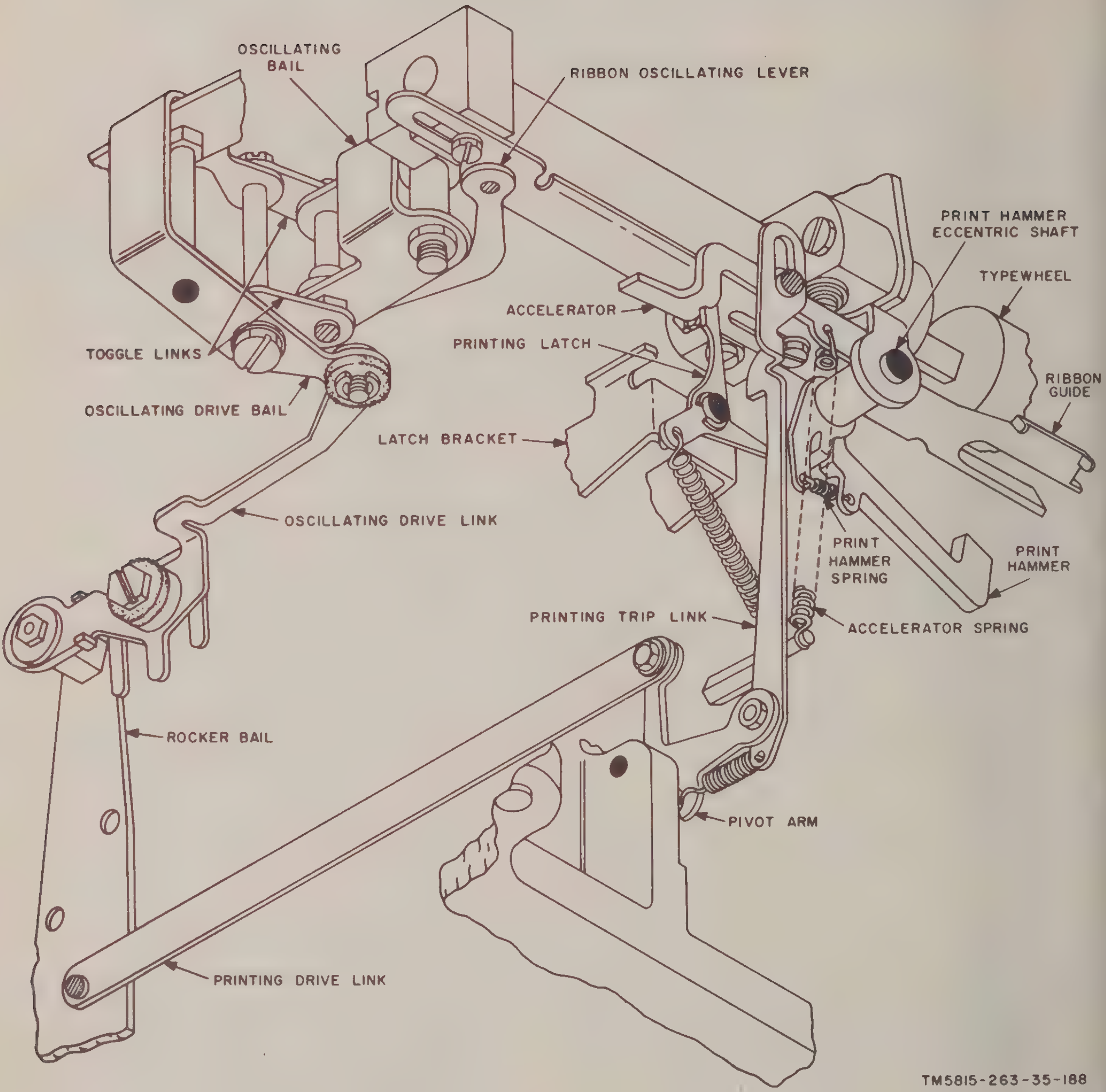

OSCILLATING BAIL
RIBBON OSCILLATING LEVER
PRINT HAMMER ECCENTRIC SHAFT
TYPEWHEEL
ACCELERATOR
PRINTING LATCH
TOGGLE LINKS
RIBBON GUIDE
OSCILLATING DRIVE BAIL
LATCH BRACKET
OSCILLATING DRIVE LINK
PRINT HAMMER SPRING
PRINT HAMMER
PRINTING TRIP LINK
ACCELERATOR SPRING
ROCKER BAIL
PIVOT ARM
PRINTING DRIVE LINK
TM5815-263-35-188

Figure 408. Printing mechanism.

print hammer bracket attached to the typewheel shaft housing. In its unoperated condition, the print hammer is held against the accelerator by the print hammer spring (fig. 408). The accelerator is mounted on the print hammer eccentric shaft and is retained (in its upper position) by a printing latch, against the tension of the accelerator spring.

b. The rocker bail, during the first half of he function cycle, moves the printing drive ink to the right, as shown in figure 408, and causes the pivot arm to rotate clockwise. The pivot arm lowers the printing trip link which slides in an elongated slot. Near the end of the rocker bail travel (in the first half of the cycle), the printing trip link pivots the printing latch which releases the accelerator. Under the spring tension, the accelerator snaps down and impels the print hammer upward. The face of the print hammer drives the tape and inked ribbon up against the typewheel and mprints the selected character on the tape. The accelerator does not follow the print hammer through the complete printing stroke. Near the end of its travel, the accelerator strikes a projection on the latch bracket and nertia carries the hammer the rest of the way. As the rocker bail returns to its home position, it causes the printing trip link to move up, release the printing latch, and return the accelerator to its latched position.

c. The following chart lists the sequence of operations for the printing mechanism.

Printing Sequence Chart

Note. The operations below occur simultaneously with those of he rotary and axial positioning mechanisms, and the correcting mechanism.

1	Rocker bail moves the printing drive link
2	Printing drive link rotates the pivot arm
3	Pivot arm moves the printing trip link down
4	Printing trip link rotates the printing latch
5	Printing latch releases the accelerator allowing its spring to pull it down.
6	Accelerator drives the print hammer upward
	Note. Before 7 below occurs, the typewheel has arrived at its proper position.
7	Print hammer drives the ribbon and tape against the typewheel.
	Note. 1 through 7 above occur during the first half of the operating cycle; the steps that follow occur during the last half.
8	Rocker bail returns to home position
9	Printing drive link, pivot arm, and printing trip link reverse their direction of movement.
10	Accelerator and print hammer move down, allowing the printing latch to relatch.

670. Ribbon Feed Mechanism

a. The characters are printed in ink by an inked ribbon which is held between the tape and the typewheel by a ribbon guide. The ribbon feed mechanism (fig. 409) functions to advance the ribbon during the typing process, to provide even wear through its entire length, and to reverse the direction of feeding when one ribbon spool becomes emptied.

b. During each function cycle, as the rocker bail nears the end of its left travel, the ribbon feed roller mounted on its forward arm (fig. 409) pivots the ribbon drive arm clockwise. The ribbon drive arm lifts the feed pawl, which advances the ribbon by rotating the ratchet and ribbon spool one tooth. The retaining pawl, under spring tension, detents the ratchet, while the feed pawl, during the latter part of the function cycle, is lowered so as to engage the next tooth. The ribbon is advanced in this manner until the mechanism is reversed.

c. When a ribbon spool is almost depleted, a rivet in the ribbon encounters the pins on one of the reversing arms, and the stress applied through the ribbon as it is rolled onto the other spool pivots the reversing arm. As the feed pawl is lowered at the end of the next operation, an extension (on the feed pawl) strikes the reversing lever, and the feed pawl is shifted against the other ratchet. The rounded lower extension on the feed pawl pivots the reversing lever which shifts the retaining pawl so that it engages the opposite ratchet. The ribbon will then feed in the opposite direction until it is again reversed.

d. The following sequence chart lists the operations for both feeding and reversing of the ribbon mechanism.

Ribbon Feed Mechanism Sequence Chart

1	Ribbon feed roller moves and strikes the ribbon drive arm.
2	Ribbon drive arm moves the pawl assembly up
3	Feed pawl rotates the ratchet one tooth

4 Ribbon spool advances the ribbon

Note. The above operations occur repeatedly until the ribbon on one spool is depleted and the following occur to reverse the direction of feeding.

5 Eye in the ribbon strikes the reversing arm, causing it to pivot.

6 Extension on the feed pawl strikes the reversing lever.

7 Feed pawl rotates to contact the opposite ratchet.

8 Reversing lever rotates and contacts the retaining pawl.

9 Retaining pawl engages the opposite ratchet

10 1 through 4 will be repeated in the opposite direction until the ribbon is wound off of this spool.

671. Power Drive Backspace Mechanism

a. The power drive backspace mechanis functions to backspace perforated tape to delete errors in punched information. The erroneous character is obliterated by pressin the LTRS keylever. Control of the power driv backspace mechanism is afforded by the TAP B. SP. keylever on the keyboard (par. 652).

b. When the backspace magnet E6 is energized, the armature bail is attracted and move down (fig. 411). As this occurs, the armatur bail extension on the armature bail disengage the drive link latch, which drops and engages notch in the eccentric arm. The eccentric arm

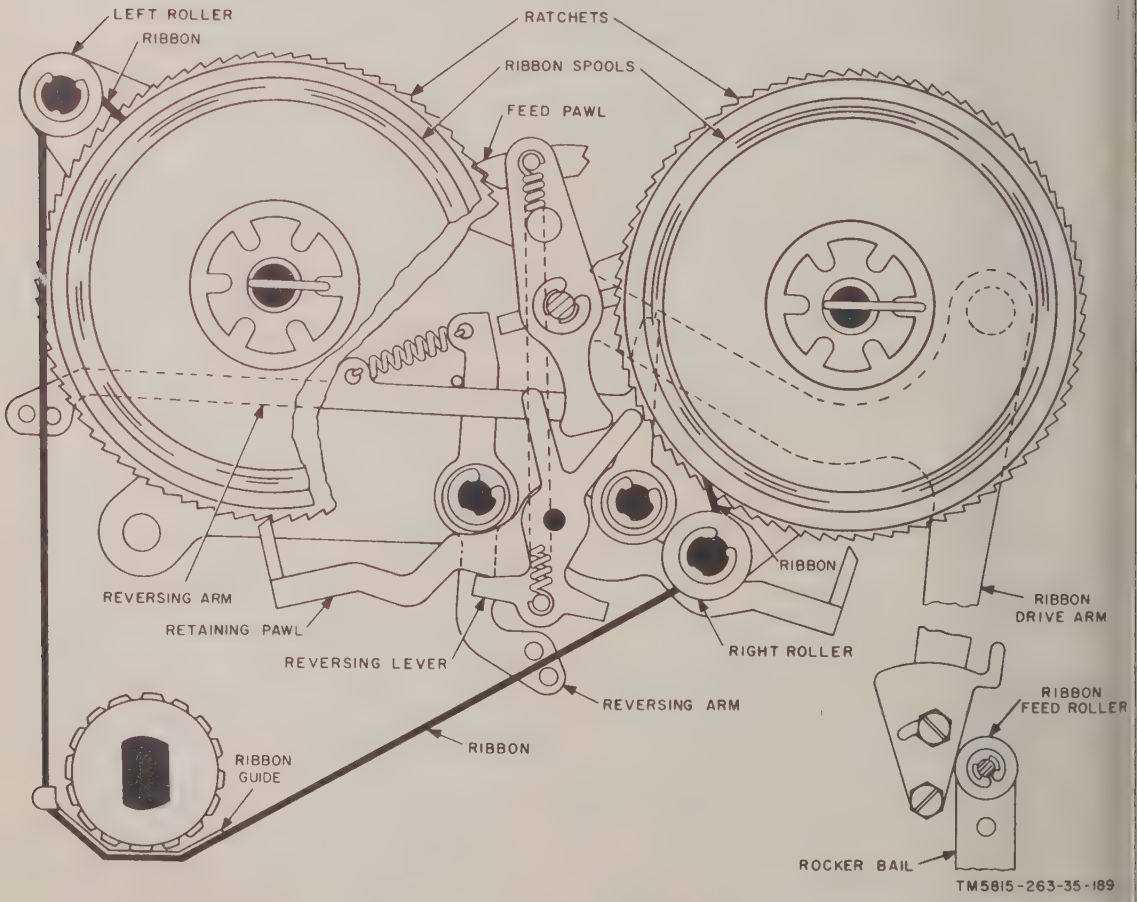

LEFT ROLLER
RIBBON
RATCHETS
RIBBON SPOOLS
FEED PAWL
REVERSING ARM
RETAINING PAWL
REVERSING LEVER
RIBBON
RIGHT ROLLER
RIBBON DRIVE ARM
REVERSING ARM
RIBBON FEED ROLLER
RIBBON
RIBBON GUIDE
ROCKER BAIL
TM5815-263-35-189

Figure 409. Ribbon feed mechanism.

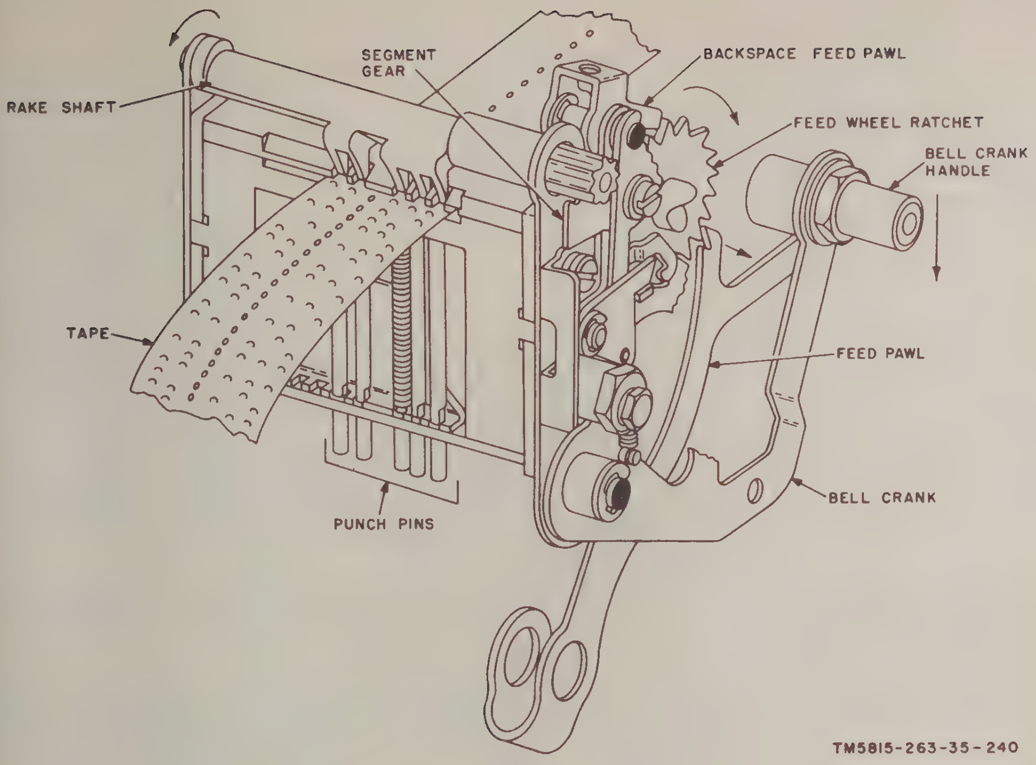
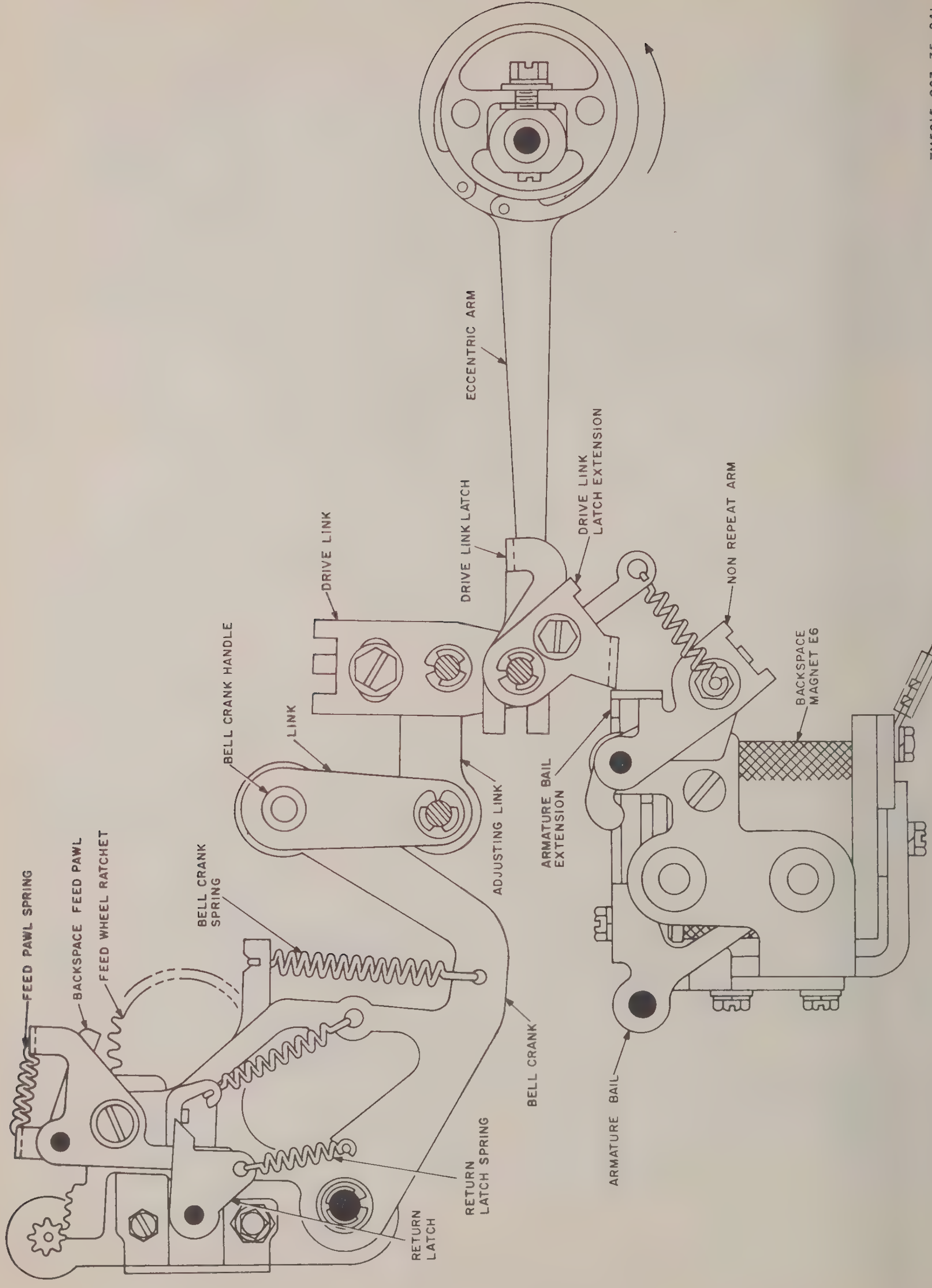


Figure 410. Power drive backspace mechanism.

riven by the perforator main shaft, moves to ie right. This action causes the bell crank andle to be depressed through the system of nkages between the drive link latch and the ell crank. Movement of the bell crank handle us causes the rake shaft (fig. 410) to be ro-ted counterclockwise through the gearing of ie rake shaft and the segment gear. The rake eth contact and depress the tape chads. hen the bell crank handle is partially de-ressed, it contacts an extension of the feed awl. Further movement downward causes the ed pawl to be disengaged from the feed wheel tchet. The backspace feed pawl then engages ie feed wheel ratchet and rotates the feed heel clockwise, moving the tape back one space to the first row of perforations. The above process is repeated until the erroneously punched character (or the first of several erroneously punched characters) is above the punch pins. The letters code is then punched in the tape to obliterate the incorrect character and all characters that follow. When the backspace magnet E6 is deenergized, the armature bail extension moves upward, and disengages the drive link from the eccentric arm. In the unoperated position, the fork of the eccentric arm slides freely along the pivot post of the drive link.

c. The following sequence chart summarizes the operations of the backspace mechanism.


ECCENTRIC ARM
DRIVE LINK LATCH
DRIVE LINK LATCH EXTENSION
NON REPEAT ARM
DRIVE LINK
BELL CRANK HANDLE
LINK
ADJUSTING LINK
ARMATURE BAIL EXTENSION
BACKSPACE MAGNET E6
FEED PAWL SPRING
BACKSPACE FEED PAWL
FEED WHEEL RATCHET
BELL CRANK SPRING
BELL CRANK
RETURN LATCH SPRING
RETURN LATCH
ARMATURE BAIL

TM5815-263-35-241

Backspace Sequence Chart

1	TAPE B. SP. keylever is depressed, closing the backspace switch S8.
2	Backspace magnet E6 energizes
3	Armature bail moves down and disengages the drive link latch.
4	Drive link latch drops down and engages a notch in the eccentric arm.
5	Eccentric arm moves the drive linkages, and the bell crank handle moves down.
6	Segment gear rotates the rake shaft
7	Rake teeth depress the chads in the tape
8	Bell crank handle moves the feed pawl out of engagement with the feed wheel ratchet.
9	Backspace feed pawl engages the feed wheel ratchet and rotates it one position.
10	Tape moves back one position
11	TAPE B. SP. keylever is released, opening the backspace switch S8.
12	Armature bail disengages the drive link from the eccentric arm.
13	Fork of the eccentric arm slides freely along the pivot post of the drive link.

72. Transmitter Distributor Outline of Operation

a. General. The transmitter distributor unctions to decode the intelligence stored in a erforated tape and transmits that intellience to the signal line in the form of marking r spacing code impulses. The transmitter disibutor is mounted on its base which prorudes from the left side of the cabinet. The ansmitter distributor is electrically isolated om the circuits of the set in the K position of e keyboard control (par. 658). In the K–T nd T positions, it is operative only when the END keylever on the keyboard is depressed par. 650) and all other circuits are completed. ransmitting from previously perforated tape, e transmitter distributor is exclusively for n-line service. It may be operated on a local rcuit for test purposes with the line test witch S2 in the TEST position.

b. Operation. With tape loaded, movement f the manual control lever to the RUN posion operates contacts to energize the clutch ip magnet, which releases the main bail and gages the clutch. The main bail causes the ensing mechanism to sense the tape perforaons and also initiate the tape feed operation. The transfer mechanism accepts the information from the sensing mechanism and passes it to the signal generator mechanism. The signal generator mechanism converts the mechanical movements to the appropriate (marking or spacing) signals, and passes them to the line. Thus the perforations for each character in the tape are read, and pulses are generated sequentially. The tape is advanced for each character and the cycle is repeated until the message is completed.

673. Function Control Mechanism

a. As described in paragraph 644, rotary motion is constantly applied to the transmitter distributor whenever the equipment motor is in operation. The purpose of the function control mechanism is to distribute this motion to the various mechanisms of the transmitter distributor for tape feed, sensing, and signal generation, as required.

b. When the manual control lever is moved to the RUN position (par. 679*b*), the clutch trip magnets E8 and E9 become energized, thus causing the armature to move up (fig. 412). As this happens, the armature bail extension cams the main bail trip lever clockwise about its pivot to release the main bail. The main bail is pulled upward through the tension of the main bail spring. When this happens, the clutch trip lever moves away from the clutch latch lever as the main bail cams the clutch trip bail. The clutch engages, and the camshaft begins to rotate. After the transmitting sequence is completed, the clutch magnet is deenergized, either by the tape out switch S14 (par. 681) or the manual control lever (par. 679*b*), and releases its armature. As this happens, the armature extension pivots out of its blocking position and allows the main bail trip lever to be moved counterclockwise by its spring. As the main bail is latched, the clutch trip lever blocks the clutch shoe lever. When this happens, the inertia of the clutch carries it so that the clutch latch lever falls into the notch on the clutch cam disk, and the clutch disengages.

c. The following chart lists the sequence of operations for the function control mechanism.

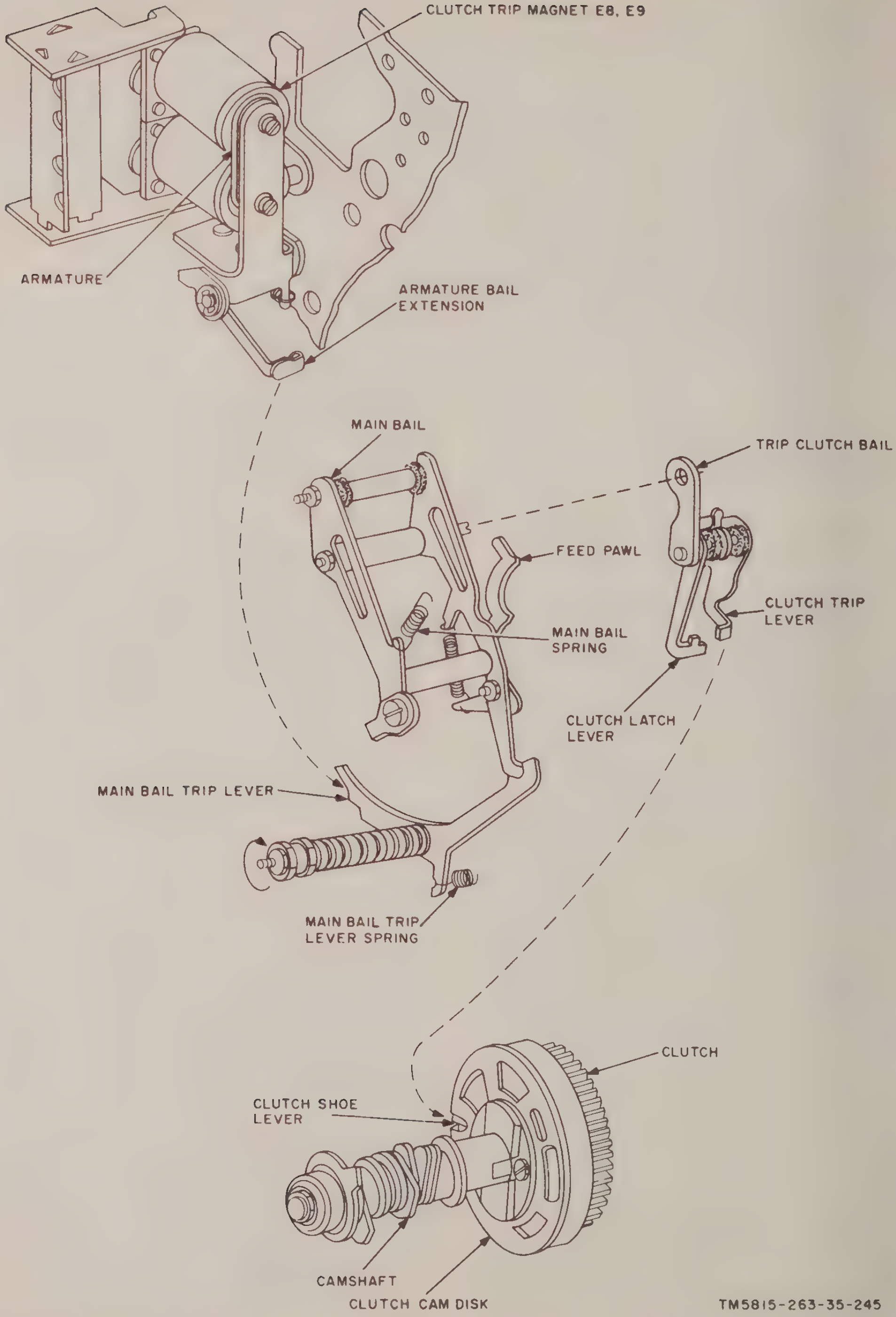

CLUTCH TRIP MAGNET E8, E9
ARMATURE
ARMATURE BAIL EXTENSION
MAIN BAIL
TRIP CLUTCH BAIL
FEED PAWL
CLUTCH TRIP LEVER
MAIN BAIL SPRING
CLUTCH LATCH LEVER
MAIN BAIL TRIP LEVER
MAIN BAIL TRIP LEVER SPRING
CLUTCH
CLUTCH SHOE LEVER
CAMSHAFT
CLUTCH CAM DISK
TM5815-263-35-245

Figure 412. Function control mechanism.

Function Control Sequence Chart

1 Clutch trip magnet energizes, pulling its armature upward.

2 Armature bail extension moves the main bail trip lever.

3 Main bail trip lever releases the main bail

Note. Simultaneously with the upward movement of the main bail, the tape is sensed (par. 675*c*).

4 Main bail swings upward, moving the clutch trip lever.

5 Clutch engages and the camshaft rotates

Note. During the cycle of camshaft rotation the operations described in paragraphs 674 through 677 occur.

6 Message is completed and clutch trip magnets are denergized.

7 Armature is released, moving the armature extension nut out the blocking position.

8 Main bail moves into the latched position

9 Clutch trip lever strikes the clutch shoe lever

10 Clutch latch lever falls into the notch of the clutch cam disk.

11 Clutch disengages

674. Tape Feed Mechanism

a. The tape feed mechanism functions, at the end of each operating cycle, to advance the tape to the next set of character perforations.

b. At the beginning of each cycle when the main bail swings upward (par. 673*b*), the feed pawl (fig. 413) is raised one ratchet tooth on the feed wheel ratchet. At the end of each cycle when the main bail pivots downward, it pulls the feed pawl downward, thus moving the feed wheel ratchet one tooth. Since the feed wheel ratchet is actually part of the feed wheel, the tape advances one character position. As the feed wheel ratchet is advanced, the action of the detent roller, which holds the feed wheel and tape in position during sensing, is overcome.

c. The following sequence chart lists the operations for the tape feed mechanism.

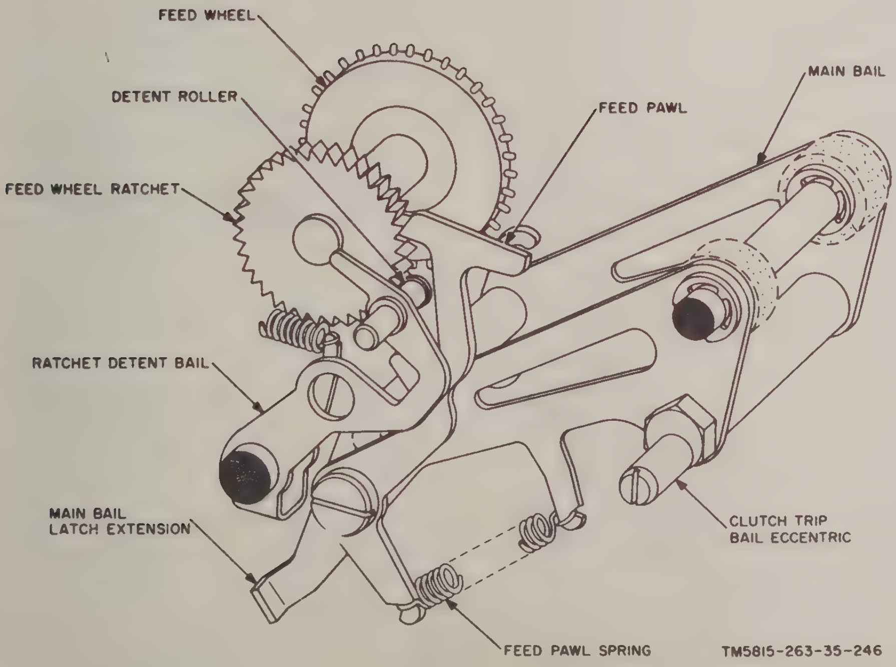


Figure 413. Tape feed mechanism, rear view.

Tape Feed Sequence Chart

1 Main bail moves upward (at the start of the sequence).
2 Feed pawl is raised one ratchet tooth
3 Main bail moves downward (at the end of the character sequence).
4 Feed pawl moves the ratchet wheel down against the action of the detent roller.
5 Tape advances one character position

675. Sensing Mechanism

a. The sensing mechanism provides the means for converting the code perforations in a tape to mechanical motions that can be used by the mechanisms of the transmitter distributor in generation of a coded impulse group. The mechanism consists of the five sensing fingers (fig. 414). The upper ends of the fingers contain sensing pins which alternately protrude from and retract beneath the tape guide plate under the tape lid. The lower ends of the fingers slide freely on a guide post, their lower extensions under the associated transfer levers of the transfer mechanism (par. 676).

b. As the main bail starts its upward travel (par. 673), the sensing fingers, responding to the action of their springs, follow in that upward movement, and attempt to pass through a perforation in the tape above (fig. 414). If one or more of the sensing fingers encounters a perforation in the tape, the pins will extend through the perforations until the projections on the rear surface of the fingers strike the bottom of the main bail spacer post (fig. 415). If any of the sensing fingers does not encounter a perforation, they are blocked and do not move upward. The resultant (upward and downward) positioning is passed to the transfer levers of the transfer mechanism by the lower projections of the sensing fingers. After the transmission of the code group is completed and the main bail moves downward, its spacer post returns the sensing fingers to their downward (at rest) condition to clear the tape guide plate and permit the tape to be advanced to the next character position without interference.

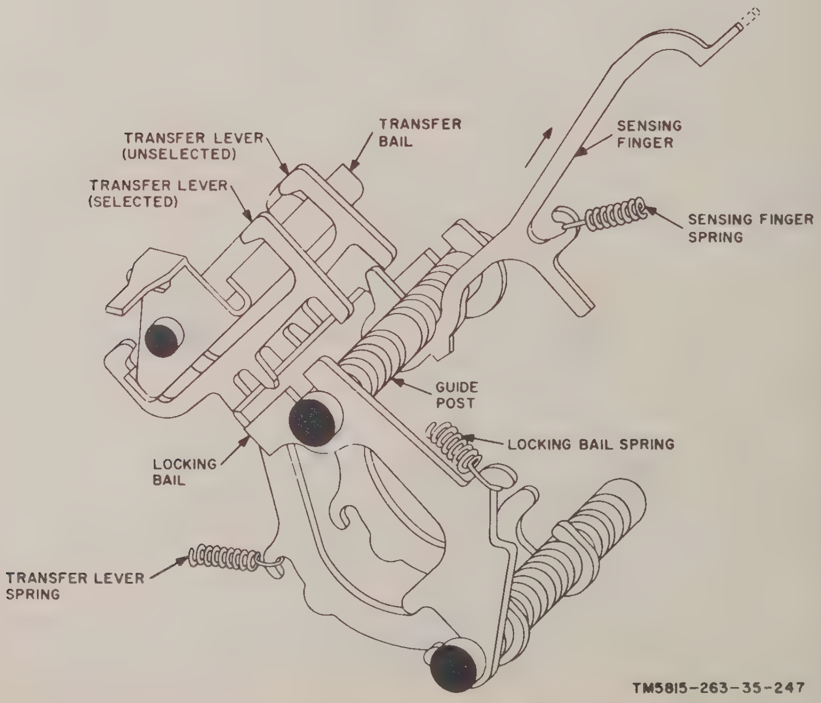


Figure 414. Sensing, locking bail, and transfer lever mechanisms.

c. The following chart lists the sequence of operations for the sensing mechanism.

Sensing Sequence Chart

1	Main bail moves upward, removing the blocking action of the spacer post from the sensing fingers.	
2	Sensing fingers move upward under their spring tension.	
3	Sensing pin moves upward through a perforation in the tape.	Sensing pin is blocked by the absence of a perforation.
4	Sensing finger projection of (selected finger) strikes the main bail spacer post.	Sensing finger (unselected) remains in position.
5	Positioning data of sensing fingers (both selected and unselected) is passed to the transfer mechanism. *Note.* At this point the transfer mechanism, due to the rotation of the cam-clutch assembly, begins to pass the positioning information to the signal generator for conversion to electrical code impulses.	
6	After transmission is completed, the main bail moves downward.	
7	Spacer post moves the sensing fingers downward *Note.* At this point the sensing fingers can begin the sequence for the next set of perforations, starting with 1 above.	

676. Transfer and Locking Bail Mechanisms

a. The transfer mechanism accepts the positioning information provided by the sensing mechanism, and converts it for use by the signal generator mechanism. The locking bail (fig. 414) sets the transfer mechanism to insure that the parts will not be disturbed until the complete code group has been transmitted. The mechanisms consist of the transfer levers, transfer bail, and locking bail. All transfer levers, except the start and stop transfer levers, are arranged to move in two directions. The forked end is moved from the selected (marking) position to the unselected (spacing) position by the associated sensing pins (par. 675). The selected condition exists when a perforation is encountered by the sensing pin, and the unselected condition exists when no perforation is found. The transfer levers are also moved downward and to the right, in proper sequence, as actuated by the camshaft of the cam-clutch assembly (fig. 416) to rotate the transfer bail into the marking or spacing position in a sequential order conforming to the transmission pattern. It is at this point that the simultaneously sensed elements of the perforated tape character code are converted to the start and stop characteristics required for signal line transmission.

b. Transfer levers are selected at the time the sensing fingers move upward (par. 675). Selecting is instantaneous in response to the movement of the sensing fingers. Just after the positioning takes place, the clutch is tripped (par. 673) and the cam-clutch assembly begins to rotate. Early in rotation, the locking bail cam (A, fig. 416) bears against the locking bail, thus positioning the locking bail blade upward between the lower extensions of the transfer levers and locks them in the selected or unselected position (fig. 414). Further rotation of the main shaft causes the lobe of the start cam (A, fig. 416) to move into such a position that the start transfer lever moves downward. Since the start transfer lever has no sensing finger, the lever is always in the spacing position. The start transfer lever's upper finger hooks the upper side of the transfer bail (fig. 414) and causes it to tilt clockwise, operating the signal generator (par. 677). As the cam-clutch assembly rotates still further, the cam for the first (number 1) code impulse moves the number 1 transfer lever downward and to the right. Depending on the position of the transfer lever finger (upper fork engaging the bail for spacing; lower fork engaging the bail for marking), the transfer bail is tilted (to the right for spacing; to the left for marking) if the pulse to be transmitted is not the same as the preceding pulse. If the preceding pulse was the same, no action occurs since the bail has already been rotated to the proper position. The second through fifth code impulses of a group are set up in the same manner as above for the first impulse. The stop pulse cam follows the fifth pulse cam as the camshaft completes its cycle of rotation. Again the action is the same as that for the first pulse, except that since the stop transfer lever has no associated sensing finger, it is blocked and its lower finger always hooks the transfer bail so that a marking impulse is set up on the completion of each character. As the cam for the first impulse starts its action, the drive arm eccentric cam (B, fig. 416), starts to cam the drive arm downward. The drive arm pulls on the main bail eccentric causing the main bail to move downward and return the sensing fingers

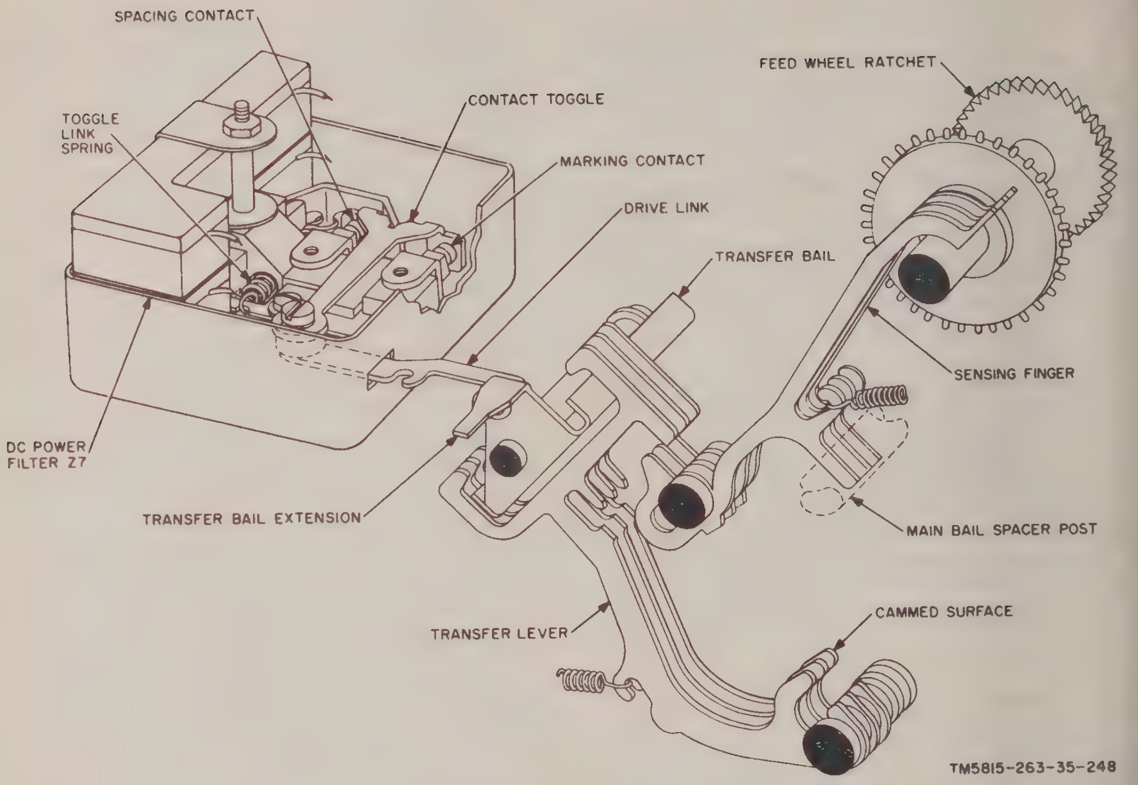

SPACING CONTACT
FEED WHEEL RATCHET
CONTACT TOGGLE
TOGGLE LINK SPRING
MARKING CONTACT
DRIVE LINK
TRANSFER BAIL
SENSING FINGER
DC POWER FILTER Z7
TRANSFER BAIL EXTENSION
MAIN BAIL SPACER POST
CAMMED SURFACE
TRANSFER LEVER
TM5815-263-35-248

Figure 415. Transfer lever and signal generator mechanisms.

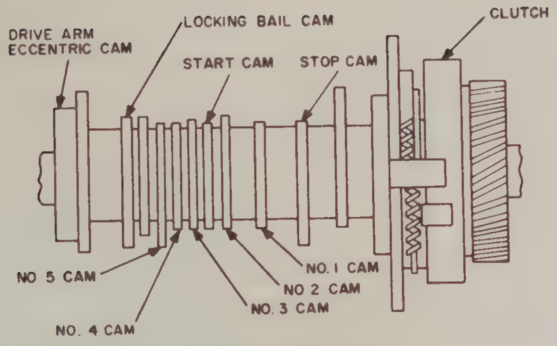
to the start position. The transfer levers return to their at rest position and the cam-clutch assembly is in a position to begin the next character transmission.

c. The following sequence chart summarizes the operations for the transfer and locking bail mechanisms.

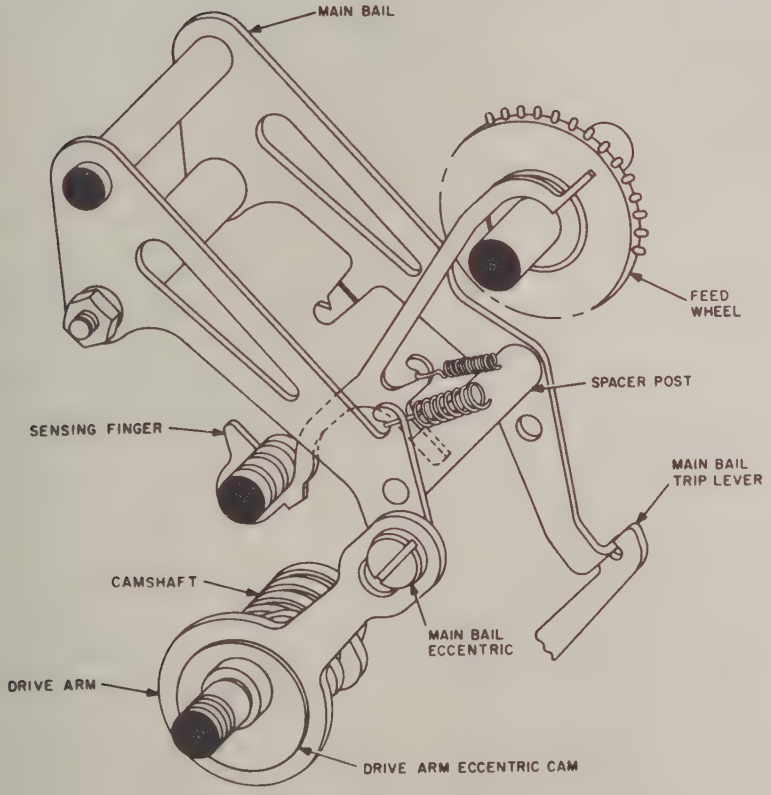
Transfer and Locking Sequence Chart

1	Main bail moves upward
2	Sensing fingers move selected transfer levers upward, and allow unselected transfer levers to remain down.
3	Clutch engages and cam-clutch assembly rotates
4	Locking bail cam moves the locking bail upward
5	Locking bail blade locks the transfer levers in place.
6	Start cam moves the start pulse transfer lever down.
7	Upper finger of the start transfer lever engages the transfer bail and tilts it clockwise.
8	Start pulse cam allows the start transfer lever to return to its at rest position.
9	Number 1 pulse cam engages the number 1 transfer lever.
10	Number 1 transfer lever tilts the transfer bail clockwise (spacing) or counterclockwise (marking), depending on the code impulse being transmitted.
11	Number 1 pulse cam allows the number 1 transfer lever to return to its at rest position.
12	Above process (steps 9 through 11) is repeated for the number 2, 3, 4, and 5 code impulses.
13	Stop pulse cam (following the number 5 pulse cam) engages the stop transfer lever.
14	Stop transfer lever tilts the transfer bail counterclockwise.
15	Stop cam allows the stop transfer lever to return to its at rest condition.
16	Main bail moves downward

Note. At this point, the sequence starting at 1 above can begin for the next set of perforations, or the clutch can disengage if at the end of the message.


DRIVE ARM ECCENTRIC CAM
LOCKING BAIL CAM
START CAM
STOP CAM
CLUTCH
NO 5 CAM
NO. 4 CAM
NO. 3 CAM
NO 2 CAM
NO. 1 CAM

A. RIGHT VIEW


MAIN BAIL
FEED WHEEL
SPACER POST
SENSING FINGER
MAIN BAIL TRIP LEVER
CAMSHAFT
MAIN BAIL ECCENTRIC
DRIVE ARM
DRIVE ARM ECCENTRIC CAM

B. RIGHT FRONT VIEW

TM5815-263-35-249

Figure 416. Cam-clutch assembly, main bail and drive arm mechanism.

677. Signal Generator Mechanism

a. The signal generator mechanism functions to convert the mechanical motions delivered by the transfer bail (par. 676) to the series of electrical pulses corresponding to the character being transmitted. The signal generator mechanism consists of the signal generator contact box, (fig. 415) the drive link, toggle link and the transfer bail extension and stabilizer (fig. 417). The drive link (fig. 415) is connected, at one end, to the top of the transfer bail; the opposite end is connected to the contact toggle portion of the transmitter distribution contacts E10. Thus the motion of the transfer bail is imparted through the drive link to the contact toggle, to contacts E10. The stabilizer, through the transfer bail extension, insures that the contacts will make and break without any bouncing action.

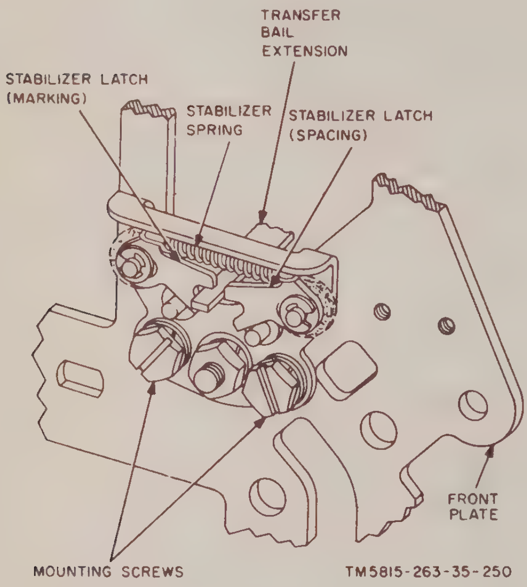


Figure 417. Transfer bail stabilizer.

b. As the transfer levers rotate the transfer bail to the left and right, the transfer bail, in turn, moves the contact toggle through the drive link in the same direction. As the contact moves to the right, the action is such that the left hand (spacing) toggle contacts of E10 act as a pivot and the right hand (marking) contacts open. The marking contacts are the only ones used in neutral signal operation; therefore, the result is an interruption of current flow or a spacing impulse is sent to the line. As the contact toggle moves to the left, the right hand contacts act as a pivot, closing the circuit so that current flows, resulting in transmission of a marking impulse. When the transfer bail moves to the left or right, its extension moves the right (marking) or left (spacing) stabilizer latch in the stabilizer (fig. 417). As this happens, the latch that was cleared drops and holds the bail (through the extension) until an opposite pulse is transmitted.

c. The following chart lists the sequence of operations for the signal generator mechanism.

Signal Generator Sequence Chart

Note. In the following sequence, the (a) steps represent marking and the (b) steps represent spacing.

1. (a) Transfer bail moves to the left.	Bail extension moves to the left, clearing the stabilizer (spacing) latch.	1. (b) Transfer bail moves to the right.	Bail extension moves to the right, clearing the stabilizer (marking) latch.
2. (a) Drive link moves to the left, moving the contact toggle of E10.	Stabilizer (spacing) latch drops and holds the bail in place.	2. (b) Drive link moves to the right, moving the contact toggle of E10.	Stabilizer (marking) latch drops and holds the bail in place.
3. (a) Right hand contacts act as a pivot and close		3. (b) Left hand contacts act as a pivot and close	
4. (a) Marking impulse is transmitted		4. (b) Spacing impulse is transmitted	

678. Tape Lid Mechanism

a. The tape lid mechanism provides a means of accurately alining the tape with the feed wheel and sensing fingers, and holding the tape flat as it is fed through the transmitter distributor. The tape lid can be opened by depressing the tape lid release plunger. The tape lid is closed by pressing the lid back into position until it latches.

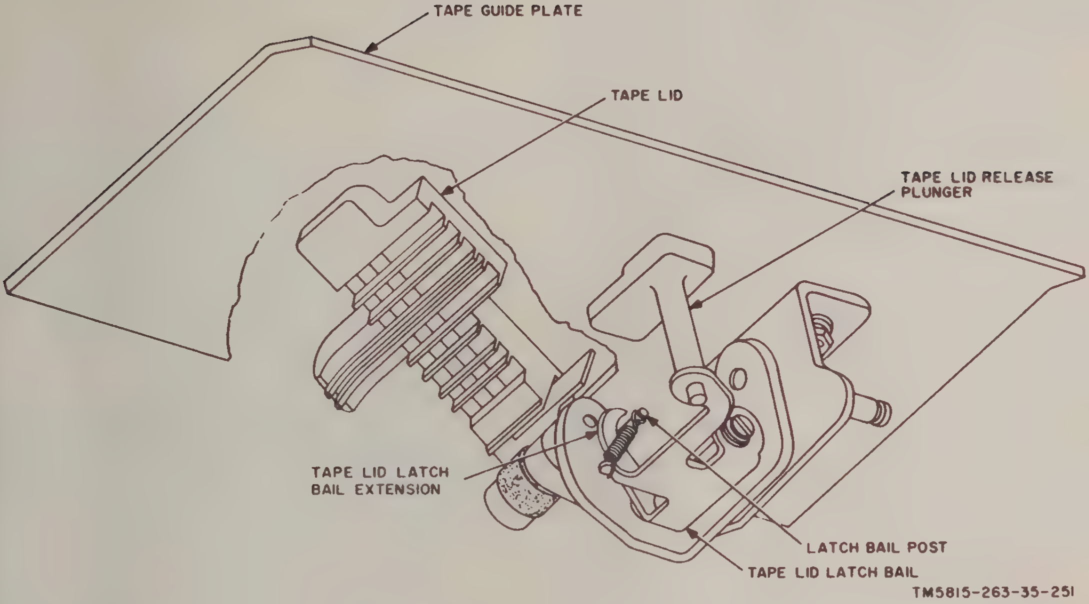


Figure 418. Tape lid mechanism, bottom view.

b. When the tape lid release plunger is depressed, the shaft portion presses against the tape lid latch bail, causing the bail (fig. 418) to pivot. In pivoting, the bail moves its latch extension from under the latch bail post, permitting the post to swing downward under the action of the tape lid release plunger spring. Since the latch bail post is mounted on the tape lid behind the pivot point and below the tape guide plate, it causes the main portion of the tape lid (above the guide plate) to swing upward and open when the post swings downward. The tape lid is closed manually by pressing it downward against the tape guide plate. When the tape lid is pushed shut, the latch bail post swings up and cams the latching extension out of its way unitl it passes the end of the extension. The extension is then pulled under the post by spring action, latching the post and tape lid in place.

c. The following sequence chart lists the operations for opening and closing of the tape lid mechanism.

Tape Lid Mechanism Sequence Chart

1	Tape lid release plunger is depressed, moving the shaft portion against the tape lid latch bail.
2	Tape lid latch bail pivots, moving its latching extension from under the latch bail post.
3	Latch bail post swings downward under spring tension.
4	Tape lid opens
	Note. The steps given above are for opening of the tape lid; those that follow are for closing.
5	Tape lid is pushed shut
6	Latch bail post moves up and cams the tape lid latch bail extension.
7	Tape lid latch bail extension moves back under the latch bail post, holding it and the tape lid in the closed position.

679. Manual Control Mechanism

a. General. The manual control mechanism provides a convenient means of controlling operation of the transmitter distributor in starting, stopping, and loading of perforated tape. Control is afforded by a three-position manual control lever. In the STOP position, circuits are disconnected and the unit is placed in its idle condition. In the RUN position, the unit is placed in full operation; and in the FREE position, the feed wheel is disengaged from the feed pawl and detent roller to permit loading of tape without opening the tape lid.

b. Run Position. When the manual control lever (fig. 419) is moved to the RUN position, the camming surface on the lower end allows the start-stop bail to move upward. As the bail pivots on its mounting, the left extension moves away from the insulated portion of the swinger of the manual control and tight tape switch S14. As this happens, the contacts of the switch close and complete the circuit to the clutch magnet, allowing it to energize and start the operating sequence (par. 673). Refer to paragraph 711*e* for circuit theory.

c. Run Sequence Chart. The following sequence chart lists the operations that occur when the manual control lever is moved to the RUN position.

Run Sequence Chart

1	Manual control lever moved to the RUN position
2	Camming surface clears the start-stop bail
3	Bail pivots and the left extension moves down
4	Switch S14 closes
5	Circuit to the magnets is completed

d. Stop Position. When the manual control lever is moved to the STOP position, the camming surface of the lever contacts the start-stop bail. As this happens, the bail pivots. In so doing, its extension cams the contact swinger of S14, allowing the switch contacts to open. As a result, the circuit to the clutch magnets is opened, causing the armature to be released.

e. Stop Sequence Chart. The following sequence chart lists the operations that occur when the manual control lever is moved to the STOP position.

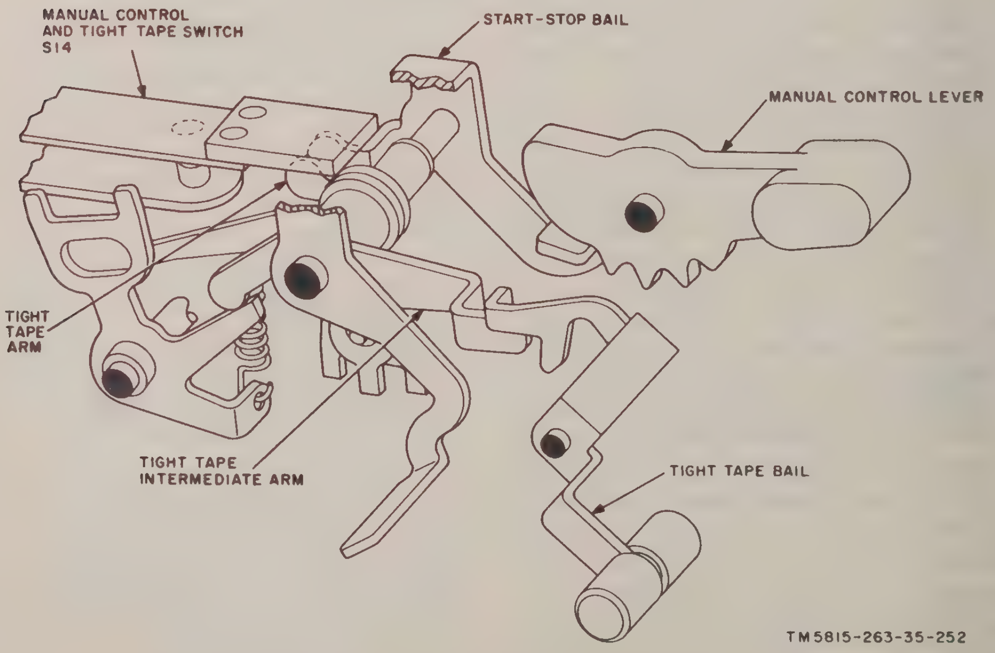


Figure 419. Start-stop and tight-tape mechanisms.

Stop Sequence Chart

1	Manual control lever moved to the STOP position.
2	Camming surface of the manual control lever contacts the start-stop bail.
3	Bail pivots and its extension moves up
4	Switch S14 opens
5	Circuit to the clutch magnets is opened

f. Free Position. When the manual control ver (fig. 419) is moved to the FREE position, e operations described in *d* above occur. In ddition, the extension on the start-stop bail fig. 420) pushes the feed pawl and the detent oller away from the feed wheel ratchet, allowng the feed wheel to rotate freely. The bail xtension also cams the intermediate bail exnsion arm, which rotates the intermediate ape out bail. The intermediate tape out bail, in otating, permits the spring-loaded tape out pin epressor bail to follow. The tape out pin epressor bail, with its operating mechanism, mounted on the depressor bail bracket which, n turn, is mounted on the front plate. The reult of the camming action is the depressing of e tape-out sensing pin to a flush or below flush ondition relative to the surface of the tape uide plate. This then permits free passage of e tape under the lid to permit tape loading ithout opening the lid.

g. Free Sequence Chart. The following seuence chart lists the operations that occur hen the manual control lever is moved to the REE position.

Free Sequence Chart

1	Maual control lever moved to the FREE position	
2	Camming surface of the manual control lever contacts the start-stop bail.	
3	Start-stop bail extension contacts the feed pawl and detent roller.	Bail extension pivots the intermediate tape out bail.
4	Feed pawl and detent roller move away from the feed wheel ratchet.	Intermediate tape out bail allows the tape out pin depressor bail to move the tape-out sensing pin.
5	Feed wheel rotates freely.	Sensing pin moves down flush or below flush with the surface of the tape guide plate.
6	Placing the manual control lever in the STOP position causes the above steps to be reversed so that the parts that have been moved return to their original positions.	

680. Tight Tape Mechanism

a. The tight tape mechanism provides a means of interrupting operation of the transmitter distributor to prevent damage to a tape in the event it should become taut, twisted, or tangled while feeding into the transmitter distributor during a transmission.

b. When the tape feeding into the transmitter distributor becomes taut or tangled, its tension or uneven surface causes the tight tape bail (fig. 419) to be raised. The bail pivots and its extension cams the tight tape intermediate arm to which the tight tape arm is secured. As the arm assembly is cammed, the associated tight tape arm lifts the contact swinger of the manual control and tight-tape switch S14 upward. As this happens, the switch contacts open, interrupting the circuit to the clutch magnets, and stopping operation. When the difficulty is cleared, the intermediate tape out bail spring (fig. 420) returns the parts to their original positions, allowing the switch to close. Refer to paragraph 711*e* for complete circuit theory.

c. The following chart summarizes the sequence of operations for the tight tape mechanism.

Tight Tape Sequence Chart

1	Tight or tangled tape raises the tight tape bail
2	Tight tape bail pivots and cams the tight tape intermediate arm and tight tape arm.
3	Tight tape arm lifts the swinger of the manual control and tight-tape switch S14.
4	Switch opens interrupting the magnet circuit
5	Operation stops

681. Tape Out Mechanism

a. The tape out mechanism is used as a method of stopping operation of the transmitter distributor when the end of a tape passes through the tape guide, or preventing operation should the manual control lever be placed to the

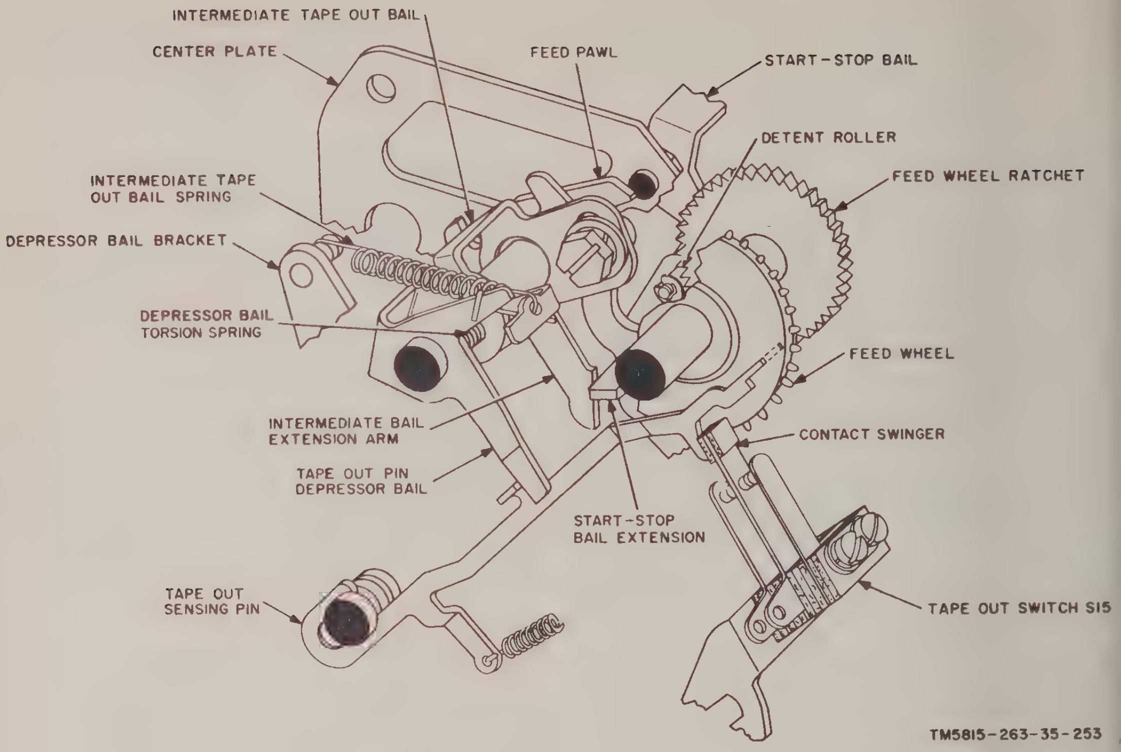

INTERMEDIATE TAPE OUT BAIL
CENTER PLATE
FEED PAWL
START-STOP BAIL
DETENT ROLLER
FEED WHEEL RATCHET
INTERMEDIATE TAPE OUT BAIL SPRING
DEPRESSOR BAIL BRACKET
DEPRESSOR BAIL TORSION SPRING
FEED WHEEL
INTERMEDIATE BAIL EXTENSION ARM
CONTACT SWINGER
TAPE OUT PIN DEPRESSOR BAIL
START-STOP BAIL EXTENSION
TAPE OUT SENSING PIN
TAPE OUT SWITCH S15
TM5815-263-35-253

Figure 420. Free wheeling and tape out mechanisms.

RUN position with no tape in position. The mechanism is actuated by the tape out sensing pin which is located on the tape guide plate, to the right and slightly forward of the five tape sensing fingers.

b. With tape loaded in the transmitter distributor, the tape out sensing pin (fig. 420) is depressed, the contact swinger of the tape out switch S15 is released, and the contacts are closed. In this condition operation is possible. When no tape is sensed, the spring-loaded sensing pin moves upward and out of the hole in the tape lid. An extension on the pin engages the contact swinger of the tape out switch, and as a result, the contact swinger moves up and the contacts open. Since the tape out switch S15 is connected in series with the magnet circuit, operation ceases or cannot be initiated. See paragraph 711*e* for circuit theory.

c. The following chart lists the sequence of operations for the tape out mechanism in stopping operation of the transmitter distributor.

Tape Out Sequence Chart

1	No tape inserted in the transmitter distributor or tape runs out.
2	Spring-loaded tape out sensing pin moves up
3	Tape out sensing pin extension engages the contact swinger, of tape out switch S15, moving it up.
4	Switch contacts open
5	Magnetic circuit is interrupted and operation is stopped or prevented.

682. Typing Unit Outline of Operation

The typing unit is a receiving mechanism. It functions to convert electrical code impulse groups, received from the signal line or from the internally-contained transmitting devices of the local set, to mechanical motions. It further converts these motions to produce a typewritten message in page form. The typing unit is mounted on the keyboard base within the cabinet dome. It is arranged to operate in ny setting (K, K-T, or T) of the keyboard ontrol. In any mode, it monitors the message eing transmitted and also provides a copy of he incoming message. The typing unit can also e operated on a local circuit for test purposes vith the line-test switch in the TEST position.

83. Selector Mechanism

a. General. The selector mechanism provides he means for converting the received electrical ode impulses into mechanical motions which letermine the characters to be printed or the unctions to be performed by the typing unit. The selector mechanism consists of the selector nagnet and armature, the selector cam-clutch ssembly, and various associated levers, arms, nd bails. The selector magnet (together with he armature) performs the transition from lectrical code signals to mechanical movements. These movements are amplified by the selector evers and push levers with motion and synhronization provided by the action of the seector cam-clutch assembly. The cam-clutch asembly is contained on the right end of the yping unit main shaft (fig. 378) and consists of from right to left) the selector clutch, the stop rm bail cam, the fifth, fourth, and third pulse elector lever cams, the spacing and marking ock lever cams, the second and first pulse selecor lever cams, the push lever reset bail cam, nd the code bar clutch trip cam.

b. Condition Before Reception of Start Impulse. Before the reception of a group of code mpulses is begun, the equipment is in a closedine (marking) condition. During this time, the elector magnet coils are energized and the seector armature is held in the upper (stop) posiion as shown in A, figure 421, thus blocking lockwise movement of the upper arm of the tart lever.

c. Reception of Start Impulse. At the beginning of a code group for any character or function, the start (spacing) impulse interrupts the urrent flow to release the selector armature. This permits the armature, under it spring ension, to move downward, thus releasing he upper arm of start lever. Tension of the tart lever spring causes the lower arm of the tart lever to turn clockwise and move the stop rm bail into the indent of its associated cam vhich is a part of the selector cam-clutch assembly (fig. 378). As the stop arm bail rotates about its pivot point, the attached clutch stop arm moves out of engagement with the clutch shoe lever (fig. 379). The primary and secondary shoes engage the clutch drum and the selector cam-clutch assembly begins to rotate counterclockwise. At this point the stop arm bail immediately rides to the high part of its cam where it remains (due to the dwell of that cam) to hold the start lever away from the selector armature during reception of the five signal pulses. Just before the reception of the five signal pulses, but immediately after the stop arm bail has approached the high part of its cam, the push lever reset bail (C, fig. 421) rides to the high part of its associated cam. During its upward motion the push lever bail contracts and unlatches the selected push levers which return to the rear (unselected) position under the tension of their springs.

d. Reception of Five-Code Impulses. The series of five selector levers, the marking lock lever, and the spacing lock lever ride their respective cams on the selector cam-clutch assembly. An indent is contanied on each of the five selector lever cams in such a position that only one of the selector levers is free to be moved to the marking position during a given pulse interval. As the cam assembly rotates, the first through the fifth selecting levers are freed for positioning in succession. As the marking and spacing pulses are applied to the selector magnet, the rotation of the cam-clutch assembly positions the cam indents so that the proper selector lever is in a position to be actuated for a given signal pulse.

e. Recording Spacing Code Impulse. When a spacing signal impulse is received (for any of the five code impulses), there is an interruption in the current flow (no-current period) through the selector magnet coils so that the selector armature drops down. The marking lock lever (B, fig. 422①) is blocked by the end of the armature and the spacing lock lever (A), due to the positioning of its cam, swings toward the rear above the armature and locks it in the spacing condition until the next code pulse is due. Extensions on the marking lock lever are so positioned at this point that they prevent the selector lever (C) from following its cam so that it remains in the forward (unselected) condition.

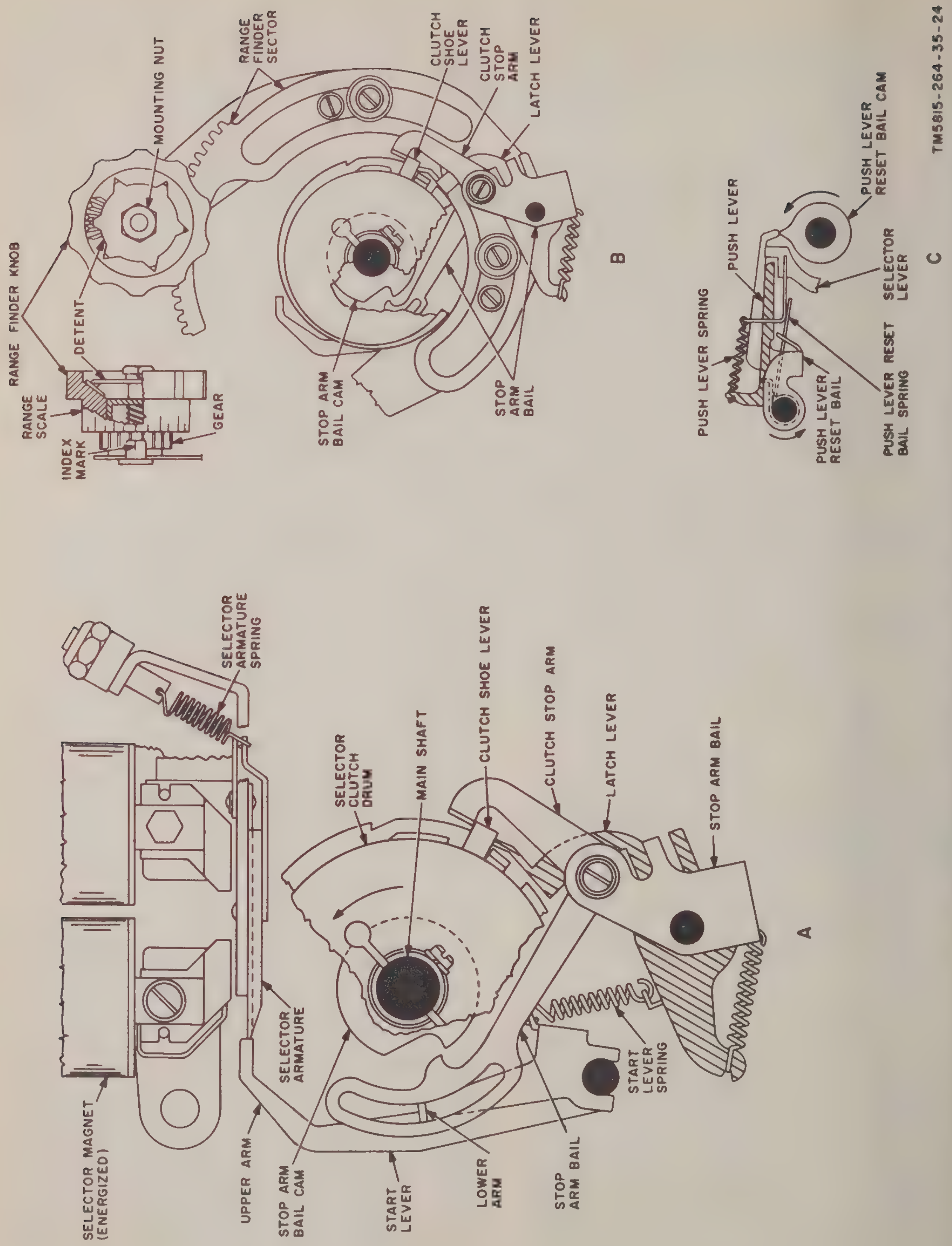

SELECTOR MAGNET (ENERGIZED)
UPPER ARM
STOP ARM BAIL CAM
START LEVER
LOWER ARM
STOP ARM BAIL
SELECTOR ARMATURE
START LEVER SPRING
SELECTOR ARMATURE SPRING
SELECTOR CLUTCH DRUM
MAIN SHAFT
CLUTCH SHOE LEVER
CLUTCH STOP ARM
LATCH LEVER
STOP ARM BAIL
A
RANGE FINDER KNOB
DETENT
RANGE SCALE
INDEX MARK
GEAR
MOUNTING NUT
RANGE FINDER SECTOR
CLUTCH SHOE LEVER
CLUTCH STOP ARM
LATCH LEVER
STOP ARM BAIL CAM
STOP ARM BAIL
B
PUSH LEVER SPRING
PUSH LEVER
PUSH LEVER RESET BAIL
PUSH LEVER RESET BAIL SPRING
SELECTOR LEVER
PUSH LEVER RESET BAIL CAM
C
TM5815-264-35-24

Figure 421. Selector mechanism.

f. Recording Marking Code Impulse. When a marking impulse is received, there is a current flow through the selector magnet coils (current-on) and the armature is attracted and moved upward against the pole pieces. As this occurs, the spacing lock lever (A, fig. 422②) is blocked by the forward end of the armature, and the marking lock lever (B), due to the positioning of its cam swings to the rear below the armature to hold it in the marking position until the next succeeding code impulse is due. During the marking condition (C), the selector levers are not blocked by the marking lock lever extensions but are permitted to move against their respective cams. The selector lever that is opposite the indent in its cam, during the time the selector armature is in a marking condition, swings to the rear or selected position momentarily. When this happens, the push lever associated with that selector lever drops into a notch on top of the selector lever, just at the time in falls into the cam indent. Thus, as the cam assembly rotates, each of the five selector levers is placed in the selected or unselected position.

g. Positioning Five Push Levers. Just after the fifth pulse is received and the number 5 selector lever is positioned, the rotation of the selector cam-clutch assembly moves the high point on all five selector lever cams, so that all selector levers are moved toward the front. Since each selector lever has an associated push lever, these too, will be moved toward the front; the selected push levers will move a greater distance than the unselected ones. Thy will remain in these positions until the start impulse of the next code group is received, at which time the selecting mechanism begins its sequence once again (*b* above). At the same time the number 5 selector lever is moved forward (during the fifth code impulse), the code bar clutch trip cam on the selector cam assembly moves the code bar clutch trip shaft operating lever to release the code bar clutch trip lever. This causes the code bar clutch to engage and begins the action described in paragraph 685.

h. Reception of Stop Impulse. As the stop impulse, at the end of the group, is received, the selector magnet coils become energized and the armature is pulled up to block the start lever. Thus the stop arm bail is prevented from dropping onto the low part of its cam (stop position of the cam-clutch assembly), and the attached stop arm is in a position to block the clutch shoe lever. The selector cam-clutch disk upon which the latch lever follower rides, has an indent at its stop position. When the clutch shoe lever strikes the stop arm, the inertia of the cam disk assembly causes it to continue to turn until its lug makes contact with the lug on the clutch shoe lever. As this happens, the latch lever drops into the indent in the clutch cam disk so the clutch becomes disengaged, where it is held until the next code group is received. It is at this point that the selector mechanism is in a condition to accept the next signal code group.

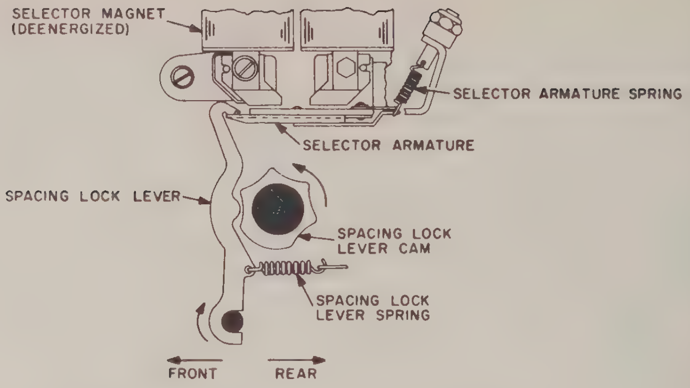
i. Selector Mechanism Sequence Chart. The chart given below summarizes the sequence of operations for the selector mechanism (*b* through *d* above).

Selector Mechanism Sequence Chart

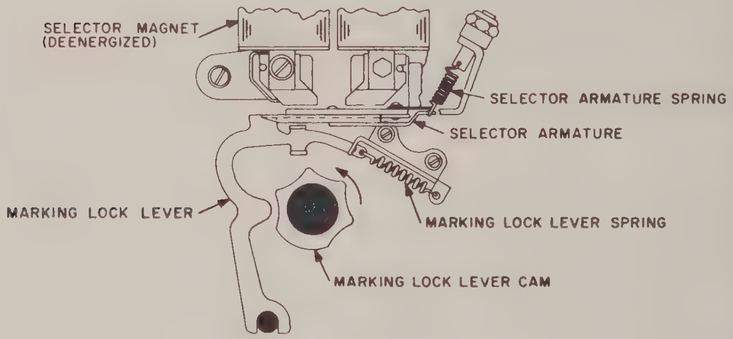
1	Start pulse is received, deenergizing the selector magnet coils, and releasing the selector armature	
2	Selector armature drops and releases the start lever	
3	Start lever releases the stop arm bail and the stop arm	
4	Selector clutch engages and the cam assembly rotates	
5	Push lever reset bail unlatches the selected push levers and resets them to the rear (unselected) position	
6	Number 1 code impulse is received, pulling the armature up against the pole pieces (marking) or letting it remain down (spacing).	Number 1 selector level cam indent is positioned opposite the number 1 selector lever.

Note. Since the number 1 code pulse can be either marking or spacing, 7 through 11 below give the sequence for either condition: (a) steps represent the spacing condition and the (b) steps represent the marking condition.

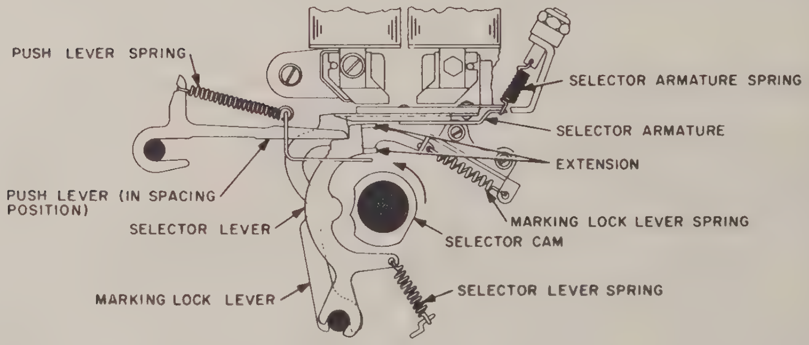
7	(a) Marking lock lever is blocked and the spacing lock lever moves to the rear locking the armature in position.	7	(b) Spacing lock lever is blocked and the marking lock lever moves to the rear locking the armature in position.
8	(a) Extensions on the marking lock lever prevent the number 1 selector lever from falling into the indent of its cam.	8	(b) Marking lock lever extensions kept clear and the number 1 selector lever falls into the indent of its cam.


SELECTOR MAGNET (DEENERGIZED)
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
SPACING LOCK LEVER
SPACING LOCK LEVER CAM
SPACING LOCK LEVER SPRING
FRONT
REAR

A. SPACING LOCK LEVER PULLED CLOCKWISE, LOCKING ARMATURE IN SPACING POSITION


SELECTOR MAGNET (DEENERGIZED)
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
MARKING LOCK LEVER
MARKING LOCK LEVER SPRING
MARKING LOCK LEVER CAM

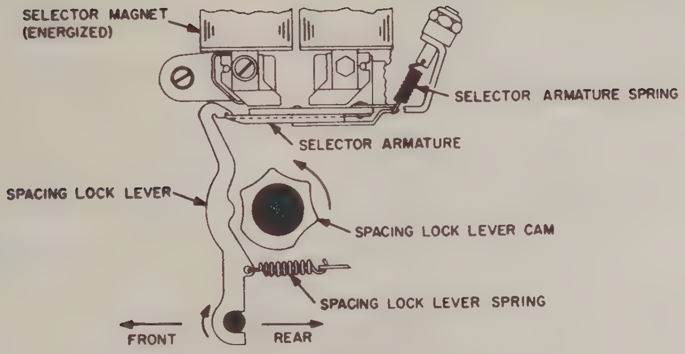
B. MARKING LOCK LEVER HELD IN COUNTER-CLOCKWISE POSITION BY ARMATURE


PUSH LEVER SPRING
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
EXTENSION
PUSH LEVER (IN SPACING POSITION)
MARKING LOCK LEVER SPRING
SELECTOR LEVER
SELECTOR CAM
SELECTOR LEVER SPRING
MARKING LOCK LEVER

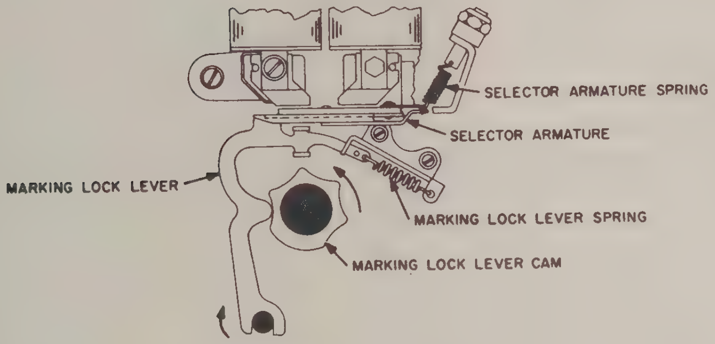
C. SELECTOR LEVER BLOCKED BY MARKING LOCK LEVER EXTENSION

TM5815-264-35-174①

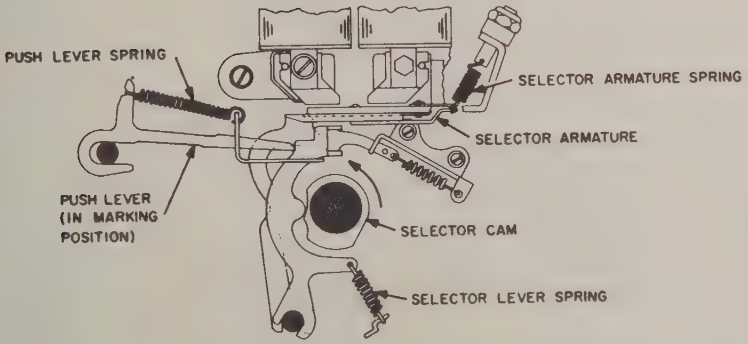
Figure 422①. Code impulse train, positioned as a result of reception of a spacing impulse (part 1 of 2).


SELECTOR MAGNET (ENERGIZED)
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
SPACING LOCK LEVER
SPACING LOCK LEVER CAM
SPACING LOCK LEVER SPRING
FRONT
REAR

A. SPACING LOCK LEVER
BLOCKED BY ARMATURE


SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
MARKING LOCK LEVER
MARKING LOCK LEVER SPRING
MARKING LOCK LEVER CAM

B. MARKING LOCK LEVER
PULLED TO REAR


PUSH LEVER SPRING
SELECTOR ARMATURE SPRING
SELECTOR ARMATURE
PUSH LEVER (IN MARKING POSITION)
SELECTOR CAM
SELECTOR LEVER SPRING

C. SELECTOR LEVER
PULLED TO REAR

TM5815-264-35-174②

Figure 422②. Code impulse train, positioned as a result of reception of a marking impulse (part 2 of 2).

Selector Mechanism Sequence Chart—Continued

9	(a) Number 1 push lever is blocked from dropping into the notch on top of the number 1 selector lever.	9	(b) Number 1 push lever drops into the notch on top of the number 1 selector lever.
10	(a) As the cam indent continues rotation, the number 1 push lever remains in the rear (unselected) position.	10	(b) As the cam indent continues rotation, the number 1 push lever moves slightly forward to the selected position.
11	(a) Spacing lock lever moves away from the selector armature.	11	(b) Marking lock lever moves away from the selector armature.
12	The number 2 through 5 code impulses orient their corresponding parts as has been indicated for the number 1 code impulse (6 through 11 above).		
13	High points on all five selector lever cams move their associated selector levers and push levers further forward. (Selected push levers move a greater distance than unselected levers.)		Code bar clutch trip cam moves the code bar clutch trip shaft operating lever to engage the code bar clutch.
Note. It is at this point that the operations described in paragraph 685 begin.			
14	Stop pulse is received and energizes the selector coils		
15	Selector armature is pulled up against the pole pieces to block the start lever		
16	Stop arm bail is blocked from moving		
17	Stop arm blocks the selector clutch shoe lever so that it strikes the clutch shoe lug as theclutch rotates		
18	The selector clutch disengages		
Note. It is at this point that the selector mechanism sequence (beginning at step 1 above) may begin for the next code impulse.			

684. Range Finder Mechanism

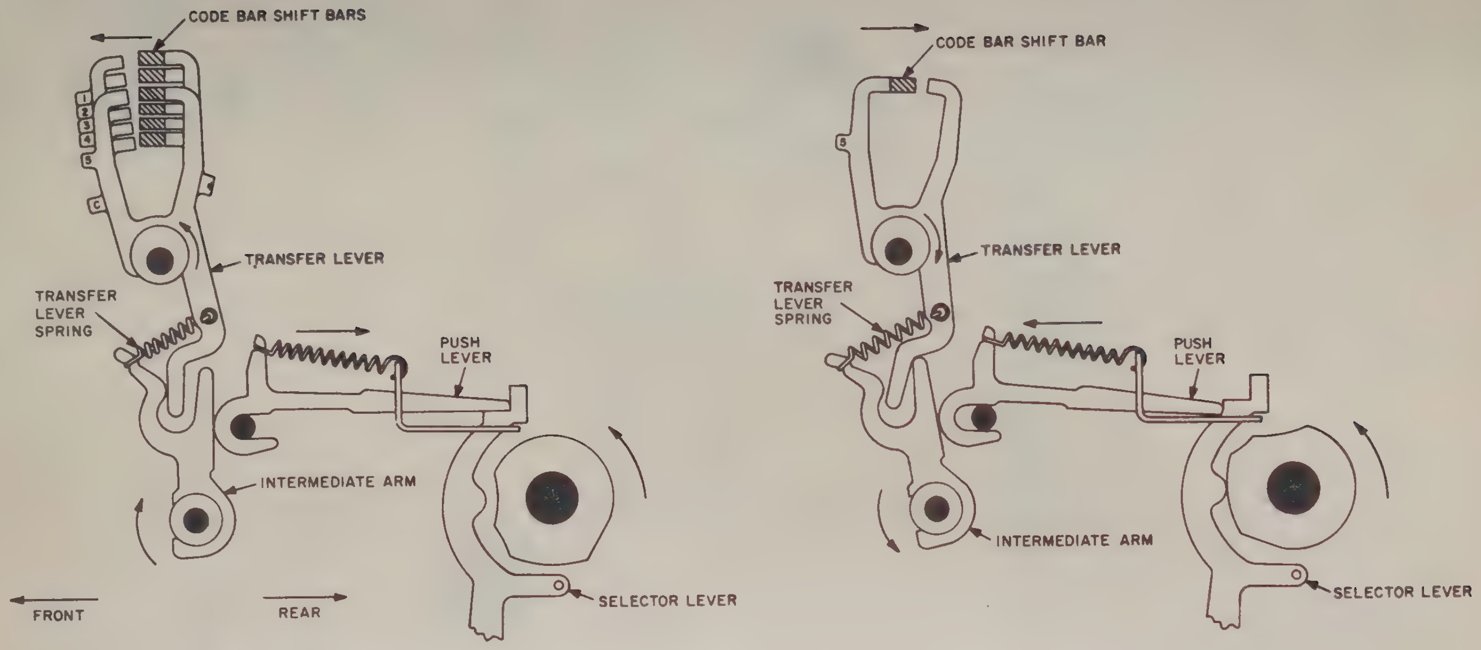
a. The range finder mechanism (part of the selector) provides a method of adjusting the selector mechanism so that it utilizes the most favorable portion of the signal pulses being received. Operation of the range finder is effected by means of the range finder knob.

b. When the range finder knob (B, fig. 421) is pushed inward and rotated, the range finder gear engages and moves the range finder sector in either a clockwise or counterclockwise direction about the selector cam-clutch assembly. Since the sector supports the stop arm bail, the stop arm and the latch lever, the effect produced by this rotation or orientation is a change in the angular position at which the selector clutch stops with respect to the selector levers. When the best setting is obtained (par. 24*c*), the knob is released and its inner teeth engage the teeth of the detent to lock the setting in place. The setting can be read from the scale contained on the range finder knob.

685. Code Bar Mechanism

a. The code bar mechanism functions to convert the positioning information, as set by the selector mechanism, for use by the printing (type box and printing carriage) and function mechanisms. The character to be printed or the function to be performed is determined basically by six code bars (1, 2, 3, 4, 5, and common). Three additional code bars (suppression, automatic carriage return line feed, and letters-figures) bring the total number of code bars to nine. The arrangement of code bars, from top to bottom, is as follows: suppression, numbers 4, 1, 5, 2, 3, common, automatic carriage return-line feed, and letters-figures (fig. 426). The suppression, automatic carriage return-line feed, and letters-figures code bars are discussed under the functions they perform. The suppression, number 1, number 2, and common code bars are longer than the rest; the reason for this is described in paragraph 686*a*(2).

b. Each push lever (numbers 1 through 5) of the selector mechanism operates an associated intermediate arm, transfer lever, and code bar shift bar (fig. 423) in the code bar mechanism. When any given push lever (A) is toward the rear (space) position, the associated intermediate arm and transfer lever are pulled toward each other by the spring tensions. This causes the transfer lever to turn counterclockwise about its pivot point to position its code bar shift bar toward the front of the typing unit (spacing position). When any given push lever (B) is toward the front (mark) position, it moves its intermediate arm to the left. This


CODE BAR SHIFT BARS
1
2
3
4
5
C
TRANSFER LEVER
TRANSFER LEVER SPRING
PUSH LEVER
INTERMEDIATE ARM
SELECTOR LEVER
FRONT
REAR
CODE BAR SHIFT BAR
5
TRANSFER LEVER
TRANSFER LEVER SPRING
PUSH LEVER
INTERMEDIATE ARM
SELECTOR LEVER

A. TRANSFER LEVERS IN SPACING POSITION

B. NO. 5 TRANSFER LEVER IN MARKING POSITION

TM5815-264-35-180

Figure 423. Code bar positioning mechanism (right side view).

causes the transfer lever to turn clockwise about its pivot point to position its code bar shift bar toward the rear of the typing unit (marking position). In addition to the five transfer levers associated with the push levers, a common transfer lever, with its code bar shift bar, is included. This transfer lever (third from the left, (B, figs. 424② and 425)). When either or both of these (numbers 1 and 2) transfer levers are moved to the rear (mark) position, they also move the common transfer lever to the rear. As the common transfer lever moves, it in turn, moves the common code bar shift bar. All of the positioning described up to this point takes place just after the reception of the fifth code impulse of a signal group when the common high points of the selector lever cams move their selector levers toward the front (par. 683*c*). At this same point (after th fifth code impulse) the code bar clutch trip car on the selector cam-clutch assembly (fig. 378 moves the trip shaft operating lever (A, fig 421①) to actuate the code bar clutch trip leve (B). This, in turn, causes the code bar clutc to engage and the assembly to begin rotating Each revolution of the code bar clutch assembl causes its associated code bar clutch followe (fig. 378) to move rearward slightly and retur to its forward position.

c. When code bar clutch follower arm move toward the rear, and since it is attached to th code bar shift lever drive shaft (C, fig. 424②) this causes the code bar shift lever drive arn to rotate raising the code shift lever link. Th rollers attached to the shift lever link are mad

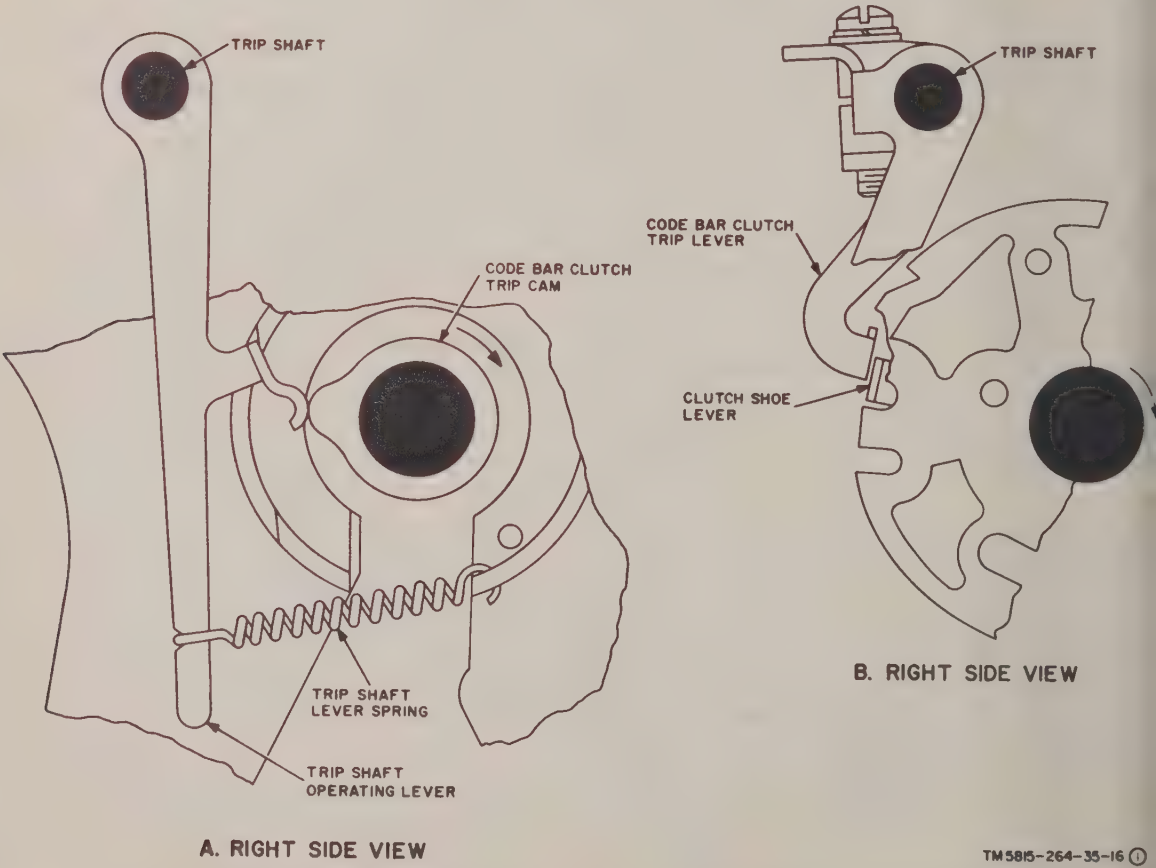

TRIP SHAFT
CODE BAR CLUTCH TRIP CAM
TRIP SHAFT LEVER SPRING
TRIP SHAFT OPERATING LEVER
A. RIGHT SIDE VIEW
TRIP SHAFT
CODE BAR CLUTCH TRIP LEVER
CLUTCH SHOE LEVER
B. RIGHT SIDE VIEW
TM5815-264-35-16 ①

Figure 424①. Code bar trip shaft mechanism and code bar positioning mechanism (part 1 of 2).

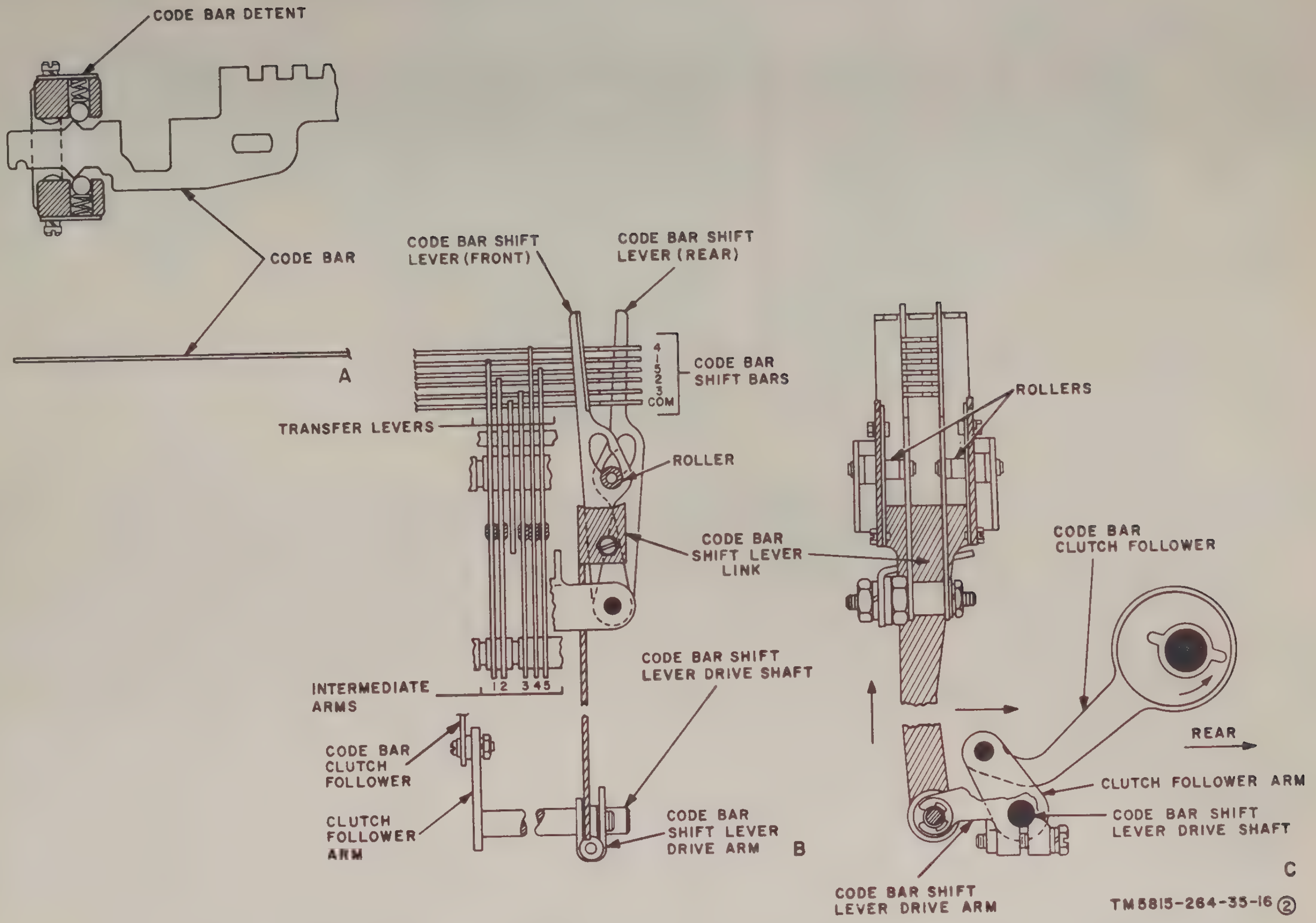

CODE BAR DETENT
CODE BAR
A
CODE BAR SHIFT LEVER (FRONT)
CODE BAR SHIFT LEVER (REAR)
4
1
5
2
3
COM
CODE BAR SHIFT BARS
TRANSFER LEVERS
ROLLER
CODE BAR SHIFT LEVER LINK
INTERMEDIATE ARMS
1 2 3 4 5
CODE BAR SHIFT LEVER DRIVE SHAFT
CODE BAR CLUTCH FOLLOWER
CLUTCH FOLLOWER ARM
CODE BAR SHIFT LEVER DRIVE ARM
B
ROLLERS
CODE BAR CLUTCH FOLLOWER
REAR
CLUTCH FOLLOWER ARM
CODE BAR SHIFT LEVER DRIVE SHAFT
CODE BAR SHIFT LEVER DRIVE ARM
C
TM5815-264-35-16 ②

Figure 424②. Code bar trip shaft mechanism and code bar positioning mechanism, front view (part 2 of 2).

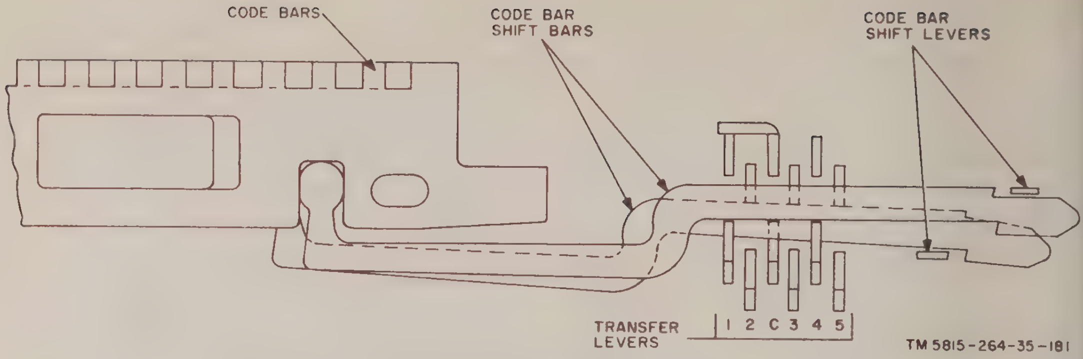


Figure 425. Code bar positioning mechanism, top view.

to move in the contoured slots of the shift levers (B, fig. 424②) so that the front shift lever moves to the right and the rear shift lever moves to the left as the link reaches the highest point of its travel. Consequently, the code bar shift bars that have been positioned toward the rear by their transfer levers (*b* above) are engaged by the rear code bar shift bar (fig. 425) and are shifted to the left. Those code bar shift bars that have been moved toward the front are engaged by the front code bar shift lever and moved to the right. Thus, the six code bar shift bars simultaneously move their respective code bars to the right or left where they are retained by a code bar detent (A, fig. 424②) until the next sequence begins. It is at this point that the ident of the code bar clutch cam (fig. 429) which is a part of the code bar clutch assembly (fig. 378) permits the cam follower spring (fig. 429) to pivot the cam follower arm rotating the clutch trip shaft. This action causes engagement of the type box clutch and the function clutch (par. 686). It is also at this point that the code bar clutch follower arm (fig. 378) begins to move toward the front, and in so doing, moves the shift lever drive arm and the shift lever link downward to their starting positions. As this happens, the clutch shoe lever strikes the code bar clutch trip lever. The inertia of the code bar clutch cam disk causes it to continue its movement until its lug makes contact with the lug on the clutch shoe lever. As this occurs, the clutch becomes disengaged and remains so until the next sequence is begun.

d. The following sequence chart lists the operations described in *b* and *c* above:

Code Bar Positioning Sequence Chart

Note. The following sequence starts just after positioning of the number 5 selector lever has taken place after the reception of the fifth code impulse (par. 683*c*).

1	Selector mechanism push levers move the intermediate arms to the front (mark) or allow them to remain at the rear (space), depending on the character received.	
2	Intermediate arms position the associated transfer levers to the front or rear accordingly.	
3	Transfer levers position the code bar shift bars to the front or rear.	Trip shaft operating lever drops into the detent of the code bar clutch trip cam.
4	Code bar clutch engages	
5	Code bar clutch assembly rotates	
6	Code bar clutch follower arm moves to the rear, moving the code bar shift lever drive shaft.	
7	Code bar shift lever drive shaft rotates and moves the code bar shift lever drive arm.	
8	Code bar shift lever drive arm moves the code bar shift lever link.	
9	Rollers on the shift lever link move the front code bar shift lever to the right, and the rear code bar shift lever to the left.	Code bar shift bars positioned toward the front are moved to the right; code bar shift bars positioned toward the rear are moved to the left.
10	Code bars are positioned to the left (marking) and right (spacing) and are held by detent action. The number 3 code bar moves the reversing slide shift lever of the front plate mechanism and the number 4 and number 5 code bars move the code bar bell cranks of the front plate mechanism. (See par. 686.)	

Code Bar Positioning Sequence Chart—Continued

11	Code bar clutch follower arm moves to the rear and moves the shift lever drive shaft in the same direction.	Code bar clutch cam follower arm drops into the indent to rotate the clutch trip shaft to engage the type box clutch and function clutch.
	Note. It is at this point that the operations described in paragraphs 686 and 687 are begun.	
12	Code bar shift lever drive shaft moves the code bar shift lever drive arm downward.	
13	Shift lever drive arm moves the shift lever link downward.	
14	Shift lever link rollers move the shift levers to their starting positions.	Clutch shoe lever strikes the code bar clutch trip lever.
15	Code bar clutch disengages *Note.* It is at this point that the sequence beginning at step 1 above can start for the next succeeding character or function.	

36. Type Box and Type Box Carriage Mechanism

a. General. All of the characters that can be rinted by the typing unit are formed by type allets which are arranged in a small type box fig. 431 ①). The type box is mounted in a arriage, which, in order to permit printing, ust position the type box so that the correct aracter is directly over the required location n the paper. Since the type pallets are aranged in four horizontal rows and sixteen vercal rows (fig. 427), positioning must be acomplished in both the horizontal and vertical lanes. The type box carriage rides on rollers along the type box carriage track which is moved vertically for positioning in the vertical plane (fig. 428). The type box carriage is positioned horizontally on that track by the oscillating rail slide and type box carriage link. The oscillating rail slide rides the oscillating rail and is clamped to the rear section of the upper wire rope. The type box carriage link provides a flexible connection to permit the type box carriage to follow both the vertical movement of the type box carriage track and the horizontal movement of the oscillating rail slide. Horizontal positioning of both the type box carriage (through the oscillating rail slide) and the printing carriage (par. 687) is accomplished by the upper wire rope (fig. 428). The upper wire rope is fastened to the spacing drum at its lower right rear end. From this point it passes part way around the spacing drum, upward and around the right oscillating rail pulley, over to the left oscillating rail pulley, and downward to the spring drum. It passes part way around the spring drum, is looped around a clamping bushing (doubling backward), and passes upward to the left printing carriage rail pulley over to the right printing carriage rail pulley, and downward to the spacing drum where it terminates and is again fastened. The lower wire rope is used to keep the two (spring and spacing) drums in phase; it is fastened to the spring drum, at its left end, and the spacing drum at its right end. A tensioning pulley rides on the underside of the lower wire rope to take up any

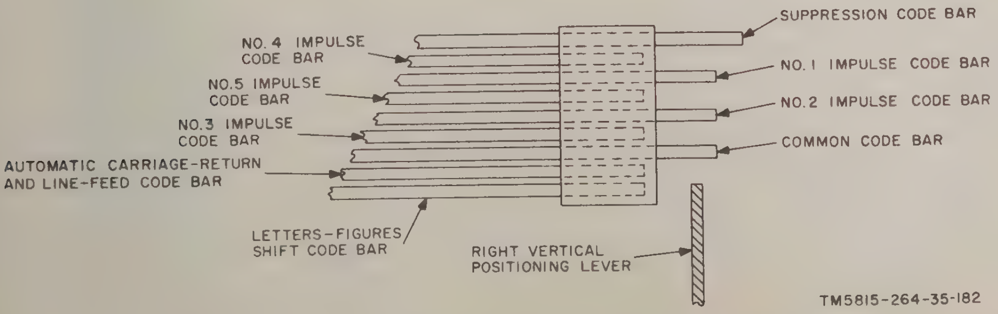
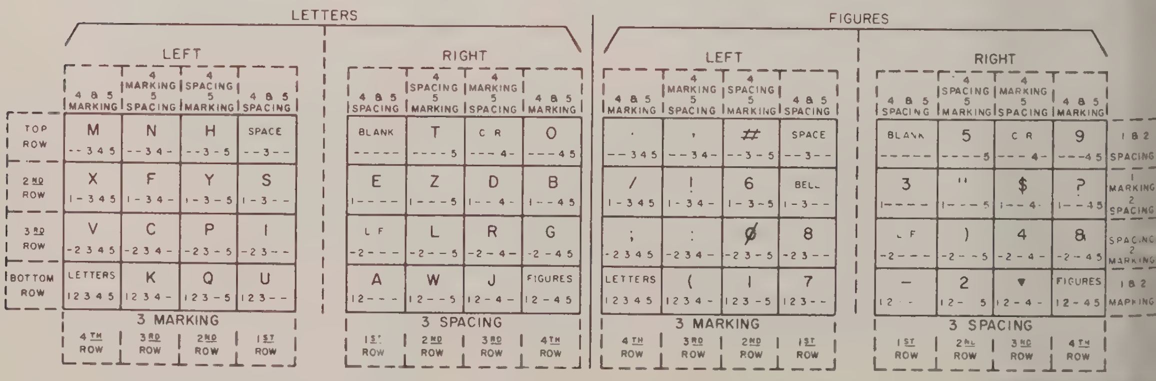


Figure 426. Code bar arrangement (code bars in extreme right-hand position).

slack which may occur due to stretching of the wire ropes. The oscillating rail is supported by rail guide arms (fig. 431 ① at either end. These arms extend downward and are pivoted on the typing unit frame at their lower ends. These devices permit the oscillating rail and upper wire rope that carries it to be shifted to the right or left without any change in position with relation to each other. The oscillating rail shift slide and the oscillating rail shift link assemblies accomplish the horizontal positioning of the oscillating rail and also connect it with the oscillating rail shift slide. The links are pivoted and are of such a length that only one can be fully extended at any given time. They are used to position the oscillating rail (and the type box) so that either the left half (letters characters) or the right half (figures characters) of the type box is positioned for printing

b. Positioning. Since the type box (hence a given pallet) must be positioned in front of the print hammer, the type box is considered to be divided into several sections (fig. 427). The arrangement and positioning of type pallets within the type box is such that the type box is first divided into two major portions: the left or letters section, and the right or figures section. Each section is further subdivided (by half) into the left four vertical rows of pallets and the right four vertical rows of pallets. The type box is also considered to consist of four horizontal rows of pallets. The operations that occur are—positioning o the type box in the vertical direction (to selec one of the four horizontal rows); selection o either the right or left group of four vertica rows; and selection of one of the rows in th group. It must be noted at this point that th descriptions below are only for positioning o the type box within a given section (eithe letters or figures), and not from one section t the other. Shifting from letters to figures sec tions (or the reverse) is considered separatel and is described in paragraph 691. Mechan isms that operate simultaneously with positioning of the type box and type box carriag are the printing mechanism (par. 687) and th ribbon mechanism (par. 690).

(1) The positioning of the code bars a set by the code bar mechanism (par 685) is the prime factor in determining which character will be printed In brief, the number 1 and number code bars (marking or spacing) determine which horizontal row is to b selected. The number 3 code bar determines whether the selection is t be made in the left four vertical row or the right four vertical rows. Th number 4 and number 5 code bar (marking or spacing) determine th selection of one row of the four vertical rows predetermined by the number 3 code bar.


LETTERS
LEFT
4 & 5 MARKING
4 MARKING 5 SPACING
4 SPACING 5 MARKING
4 & 5 SPACING
TOP ROW
2ND ROW
3RD ROW
BOTTOM ROW
M --345
N --34-
H --3-5
SPACE --3--
X 1-345
F 1-34-
Y 1-3-5
S 1-3--
V -2345
C -234-
P -23-5
I -23--
LETTERS 12345
K 1234-
Q 123-5
U 123--
3 MARKING
4TH ROW
3RD ROW
2ND ROW
1ST ROW
RIGHT
4 & 5 SPACING
4 SPACING 5 MARKING
4 MARKING 5 SPACING
4 & 5 MARKING
BLANK -----
T ----5
C R ---4-
O ---45
E 1----
Z 1---5
D 1--4-
B 1--45
L F -2---
L -2--5
R -2-4-
G -2-45
A 12---
W 12--5
J 12-4-
FIGURES 12-45
3 SPACING
1ST ROW
2ND ROW
3RD ROW
4TH ROW
FIGURES
LEFT
. --345
, --34-
# --3-5
SPACE --3--
/ 1-345
! 1-34-
6 1-3-5
BELL 1-3--
; -2345
: -234-
Ø -23-5
8 -23--
LETTERS 12345
(1234-
I 123-5
7 123--
3 MARKING
RIGHT
BLANK -----
5 ----5
C R ---4-
9 ---45
3 1----
" 1---5
$ 1--4-
? 1--45
L F -2---
) -2--5
4 -2-4-
8 -2-45
— 12---
2 12--5
▼ 12-4-
FIGURES 12-45
3 SPACING
1 & 2 SPACING
1 MARKING 2 SPACING
SPACING 2 MARKING
1 & 2 MARKING

TM5815-264-35-183

Figure 427. Type box arrangement, viewed from front of typing unit.

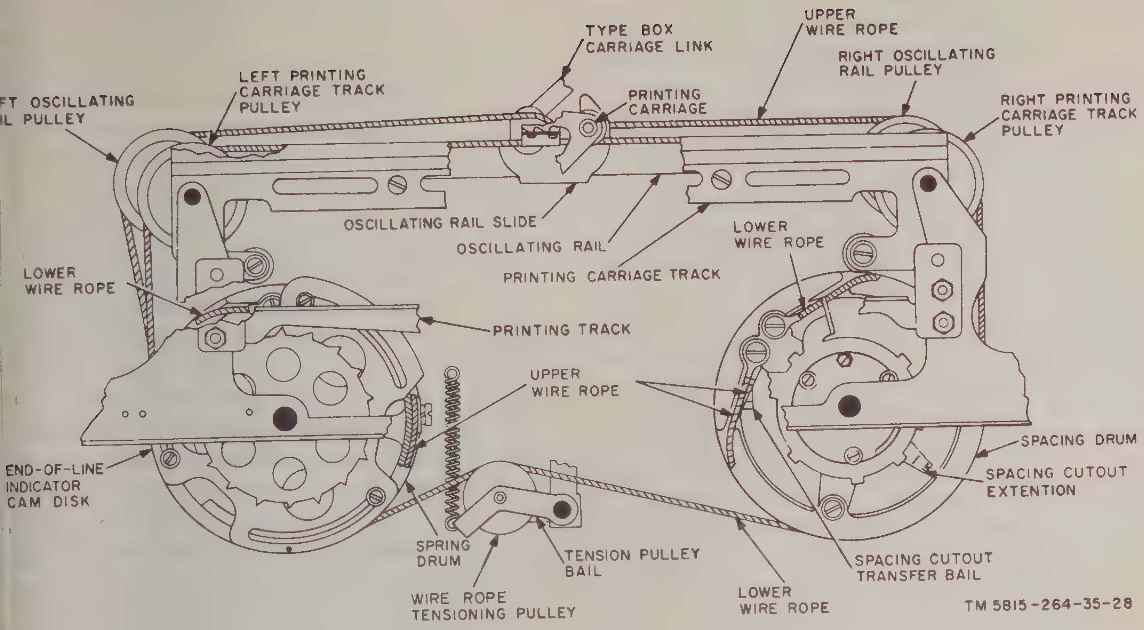

TYPE BOX CARRIAGE LINK
UPPER WIRE ROPE
RIGHT OSCILLATING RAIL PULLEY
LEFT PRINTING CARRIAGE TRACK PULLEY
FT OSCILLATING
IL PULLEY
PRINTING CARRIAGE
RIGHT PRINTING CARRIAGE TRACK PULLEY
OSCILLATING RAIL SLIDE
OSCILLATING RAIL
LOWER WIRE ROPE
LOWER WIRE ROPE
PRINTING CARRIAGE TRACK
PRINTING TRACK
UPPER WIRE ROPE
SPACING DRUM
END-OF-LINE INDICATOR CAM DISK
SPACING CUTOUT EXTENTION
SPRING DRUM
TENSION PULLEY BAIL
SPACING CUTOUT TRANSFER BAIL
WIRE ROPE TENSIONING PULLEY
LOWER WIRE ROPE
TM 5815-264-35-28

Figure 428. Front plate mechanism.

(2) Four code bars in the code bar mechanism, (from top to bottom) suppression, number 1, number 2, and common (fig. 426), are longer than the rest of the code bars and extend through the right code bar bracket. They serve as stops for the right vertical positioning levers (fig. 430). Notches are arranged in the left ends of the code bars so that the left vertical positioning lever assemblies stopped, in each case by the same code bar that blocks the right vertical positioning lever assembly. After all code bars have been positioned by the code bar mechanism (par. 685), the code bar clutch cam follower arm and its roller are moved by the indent on the code bar clutch cam (fig. 429) so that the attached clutch trip lever shaft is rotated. As this shaft turns, it first causes the function clutch trip lever to release the function clutch (causing it to engage), and then causes the type box clutch trip arm to engage its trip lever, allowing the type box clutch to engage. As the type box clutch assembly rotates, its movement causes the main rocker shaft drive link (fig. 435) to move the main rocker shaft left bracket which is attached to the left end of the main rocker shaft. This causes the main rocker shaft (as viewed in fig. 430) to rotate in a counterclockwise direction. This motion, in turn, is passed through the main rocker shaft brackets and main side lever drive links to the main side levers. Since the main side levers are pivoted at the rear, the front end moves upward, carrying the vertical positioning lever assembly in the same direction. The vertical positioning lever assembly consists of the vertical positioning lever with a slide extension, lower link extension, and upper link extension. When the toe of the upper link extension contacts one of the extended code bars, the upper link extension pivots counterclockwise, causing the upper part of

the lower link extension to move rearward. Since the type box carriage track is mounted between the left and right vertical positioning levers, the vertical motion and orientation of the levers controls the positioning of the track in the vertical plane, thus controlling the selection of a character in a horizontal row. When the number 1 and number 2 code bars are toward the right (spacing), the common code bar is also positioned toward the right where it blocks the vertical positioning levers in their upward travel. Since the common code bar is the lowest of the four code bars that project, the top horizontal row of pallets in the type box will be in line for printing. When the number 1 code bar is toward the left (marking), and the number 2 code bar is toward the right (spacing), and common code bar is toward the left. Thus the number 2 code bar (second lowest) blocks the vertical positioning levers at the second level and the second row of pallets (from the top of the type box) is in line for printing. When the number 1 code bar is toward the right (spacing) and the number 2 code bar is toward the lef (marking), the common code bar i also toward the left. Thus the uppe link extension on the vertical positioning levers is not blocked until i contacts the number 1 code bar s that the third horizontal row of pallets (from the top of the type box) i in line for printing. When the number 1 and number 2 code bars ar positioned toward the left, so also i the common code bar. This mean that the suppression code bar is th one that blocks the vertical positioning levers so that the fourth or bottom row of pallets in the type box i in line for printing. The upwar motion of the main side lever cause the ribbon drive link to move an operate the ribbon mechanism (par 690). As this occurs the main sid lever follower arm becomes unblocked at its lower right point and i permitted to rotate about its pivo (under its associated spring tension) Since the vertical positioning loc lever is attached to the follower arm it moves forward against the vertica positioning levers. Thus at each of th

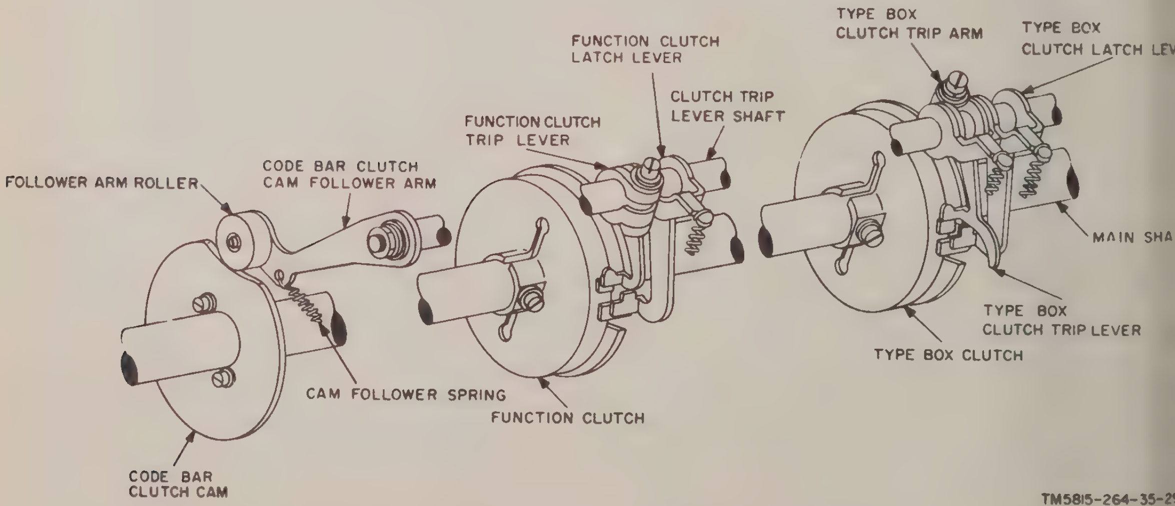

TYPE BOX
CLUTCH TRIP ARM
TYPE BOX
CLUTCH LATCH LEV
FUNCTION CLUTCH
LATCH LEVER
CLUTCH TRIP
LEVER SHAFT
FUNCTION CLUTCH
TRIP LEVER
CODE BAR CLUTCH
CAM FOLLOWER ARM
FOLLOWER ARM ROLLER
MAIN SHA
TYPE BOX
CLUTCH TRIP LEVER
TYPE BOX CLUTCH
CAM FOLLOWER SPRING
FUNCTION CLUTCH
CODE BAR
CLUTCH CAM
TM5815-264-35-2

Figure 429. Trip mechanism for function and type box clutches.

four levels at which the vertical positioning levers are stopped, they are locked for a short time by the notches on the vertical positioning lock levers.

(3) The description that follows gives the operations that determine which of the two groups of four vertical rows of type pallets (left or right) are to be selected for printing. This selection, in effect, is actually the beginning of motion in a given direction and is further continued (as described in (4) below) until a particular vertical row is actually selected. At the same time motion is applied to the vertical positioning parts by the main rocker shaft ((2) above), a downward motion is also supplied by the main rocker shaft, through the main bail bracket (attached to the rocker shaft) and the main bail links, to the main bail (fig. 431①). The main bail, in turn, applies motion to the oscillating rail shift slide through the right and left shift drive link assemblies. These link assemblies are of a knee action (buckling) type. As the main bail moves downward, the left and right shift drive link assemblies cause the oscillating rail shift slide to shift either toward the right or left. This left or right shifting action is controlled by the number 3 code bar through the left or right (marking or spacing) position to which it has been set (par. 685). The number 3 code bar contains a projecting tab on its front edge that engages with the horizontal motion reversing slide shift lever (B, fig. 431②). When the number 3 code bar is in the right (spacing) position, the horizontal motion reversing slide is also positioned toward the right and is held there by the detent levers and detent rollers. The left reversing slide bracket then contacts the left shift drive link assembly causing the assembly to buckle at pivot point A (A, fig. 431②). Thus, as the main bail moves downward, the unbuckled right shift drive link assembly moves the oscillating rail shift slide to the left and, in so doing positions the type box so that the right group of four vertical rows (in either the letters or figures section) is selected. This is accomplished through the left and right oscillating rail shift link assemblies, oscillating rail, and the type box carriage. In a similar manner, when the number 3 code bar is positioned toward the left (marking), the horizontal motion reversing slide is also shifted toward the left and is held there by the detent levers and detent rollers. The right reversing slide bracket contacts the right shift drive link assembly causing it to buckle. Thus, as the main bail moves downward, the unbuckled left shift drive link assembly moves the oscillating rail shift slide toward the right. This, then positions the type box so that the character to be printed will be found in the left group of four vertical rows.

(4) After it has been determined in which group of four vertical rows, (3) above, the character to be printed is located, the particular row in this group must be determined. This is accomplished by the positioning of the number 4 and number 5 code bars (par. 685). The number 4 (upper) and number 5 (lower) code bars each contain a notch on their forward edge (B, fig. 432) which engages a code bar bell crank. Each bell crank positions a horizontal motion stop slide toward the front (marking) or (through its spring) toward the rear (spacing) position. The upper stop slide is operated by the number 4 code bar, and the lower stop slide is operated by the number 5 code bar. A third (common) horizontal motion stop slide (held to the rear under spring tension) is located between the upper and lower stop slides (C, fig. 431③). It contains projecting tabs which pass across the front edges of the upper and lower horizontal motion stop slides, so that it will not move to the rear (spacing) position unless both

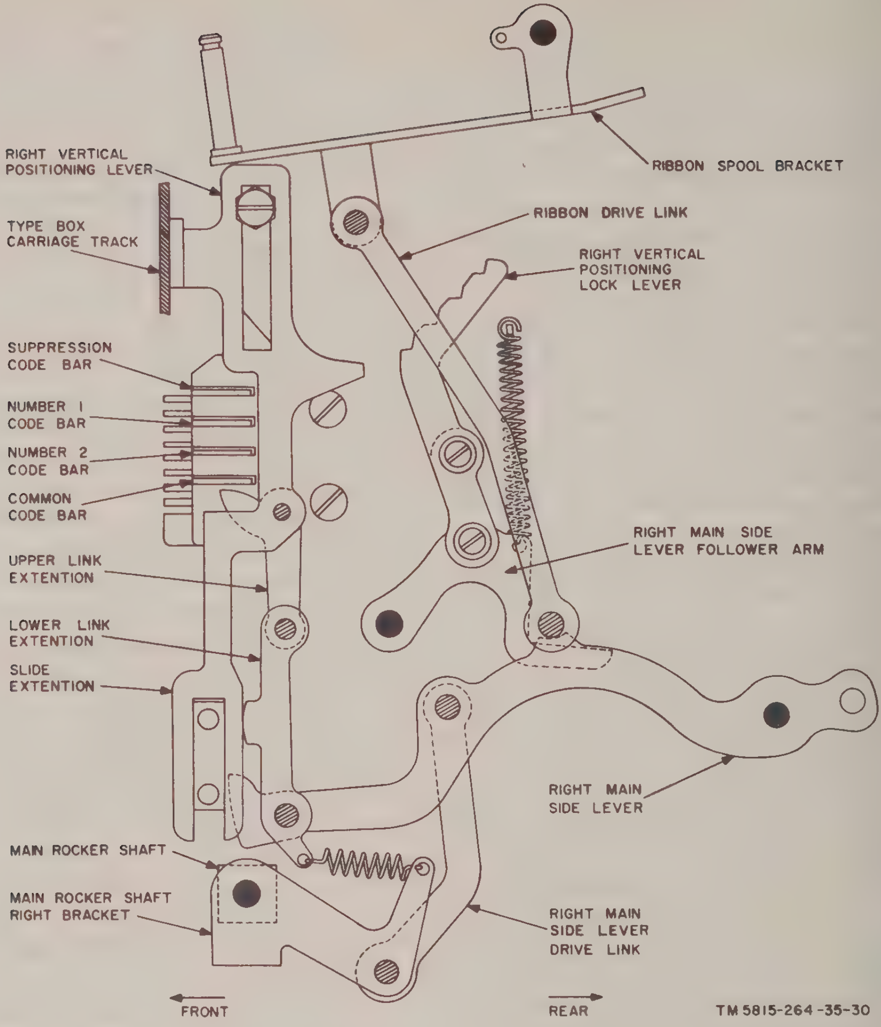

RIGHT VERTICAL POSITIONING LEVER
TYPE BOX CARRIAGE TRACK
SUPPRESSION CODE BAR
NUMBER 1 CODE BAR
NUMBER 2 CODE BAR
COMMON CODE BAR
UPPER LINK EXTENTION
LOWER LINK EXTENTION
SLIDE EXTENTION
MAIN ROCKER SHAFT
MAIN ROCKER SHAFT RIGHT BRACKET
RIBBON SPOOL BRACKET
RIBBON DRIVE LINK
RIGHT VERTICAL POSITIONING LOCK LEVER
RIGHT MAIN SIDE LEVER FOLLOWER ARM
RIGHT MAIN SIDE LEVER
RIGHT MAIN SIDE LEVER DRIVE LINK
FRONT
REAR
TM 5815-264-35-30

Figure 430. Right side mechanism.

the upper and lower horizontal motion stop slides are in the spacing (rear) position. The blocking (front) portion of each of the three stop slides is of different width. The common horizontal motion stop slide includes two blocking steps; the outer (wider) blocking step is wider than either the upper or lower horizontal motion stop slide. The lower horizontal motion stop slide is narrower than the upper horizontal stop slide. The inner blocking step (Shank) of the common stop slide is the narrowest. As the main bail is pulled downward by the rocket shaft, it also carries with it the horizontal positioning lock lever; through its attached yield spring (D, fig. 431③). The wedge-shaped portion of the horizontal positioning lock lever is then brought to bear against the horizontal positioning lock lever arm. This arm drives the oscillating rail shift slide in the direction in which it was started (by the number 3 code bar) until one of the two decelerating slides which are mounted on the oscillating rail shift slide strikes an unselected one of the horizontal motion stop slides. A camming surface on the unbuckled shift drive link assemblies makes contact with and rolls down the face of the decelerating slide, causing the drive link assemblies to buckle. The oscillating rail shift slide finally comes to rest when it strikes the blocked decelerating slide. This, in turn, ends the downward movement of the horizontal positioning lock lever, and the yield spring is extended until the main bail reaches the lowest point of its travel. It is at this point that the print hammer is released (par. 687) to strike the pallet positioned in front of it to imprint the character on the paper. The positioning of the type box selection of a particular vertical row of pallets within the letters of figures portion of the type box is described below. Refer to paragraph 692 for a description of the operation of the letters-figures shift mechanism. When both the number 4 and number 5 code bars are positioned to the right (spacing), their respective horizontal motion stop slides and the common stop slide are toward the rear. The oscillating rail shift slide will then move to the left or right (as determined by the number 3 code bar) until it is stopped by the outer (wider) blocking portion of the horizontal motion stop slide. If the letters-figures shift mechanism is in the letters position (par. 687) the first vertical row (left or right of center of the letters portion of the type box) will be in line for printing. When the number 4 code bar is toward the right (spacing) and the number 5 code bar is toward the left (marking) the lower and common stop slide are toward the front and the upper stop slide is toward the rear. The oscillating rail shift slide will move to the right or left until it strikes one end of the upper horizontal motion stop slide. This positions the second vertical row (right or left of center of the letters portion of the type box) in line for printing. When the number 4 code bar is toward the left (marking) and the number 5 code bar is toward the right (spacing), the upper and the common stop slides are toward the front and the lower stop slide is toward the rear. The oscillating rail shift slide will move (in the direction in which it was started) until it is stopped by one end of the lower stop slide and the third vertical row of characters (right or left of center of the letters portion of the type box) will be in line for printing. When both the number 4 and number 5 code bars are toward the left (marking), their respective horizontal motion stop slides and the common stop slide are toward the front. The oscillating rail shift slide is moved (in the direction in which it was started) until it is stopped by one side of the shank of the common stop slide and the fourth vertical row (right or left of center of the letters portion of the type box) in line for printing.

(5) All of the actions described in (2) through (4) above begin with the engagement of the type box clutch and the start of the main rocker shaft movement. They occur simultaneously, so that the proper type pallet is in position at the completion of the downward movement of the main rocker shaft (approximately half way through the type box clutch travel). As the rotation of the type box clutch moves past the half way point, the eccentric arm causes the main rocker shaft to reverse its direction of movement. Thus all parts that were moved by the motion of the rocker shaft also reverse their direction, due to the reverse motion of the rocker shaft, and are returned to their original (starting) positions. It is during this returning movement that the spacing

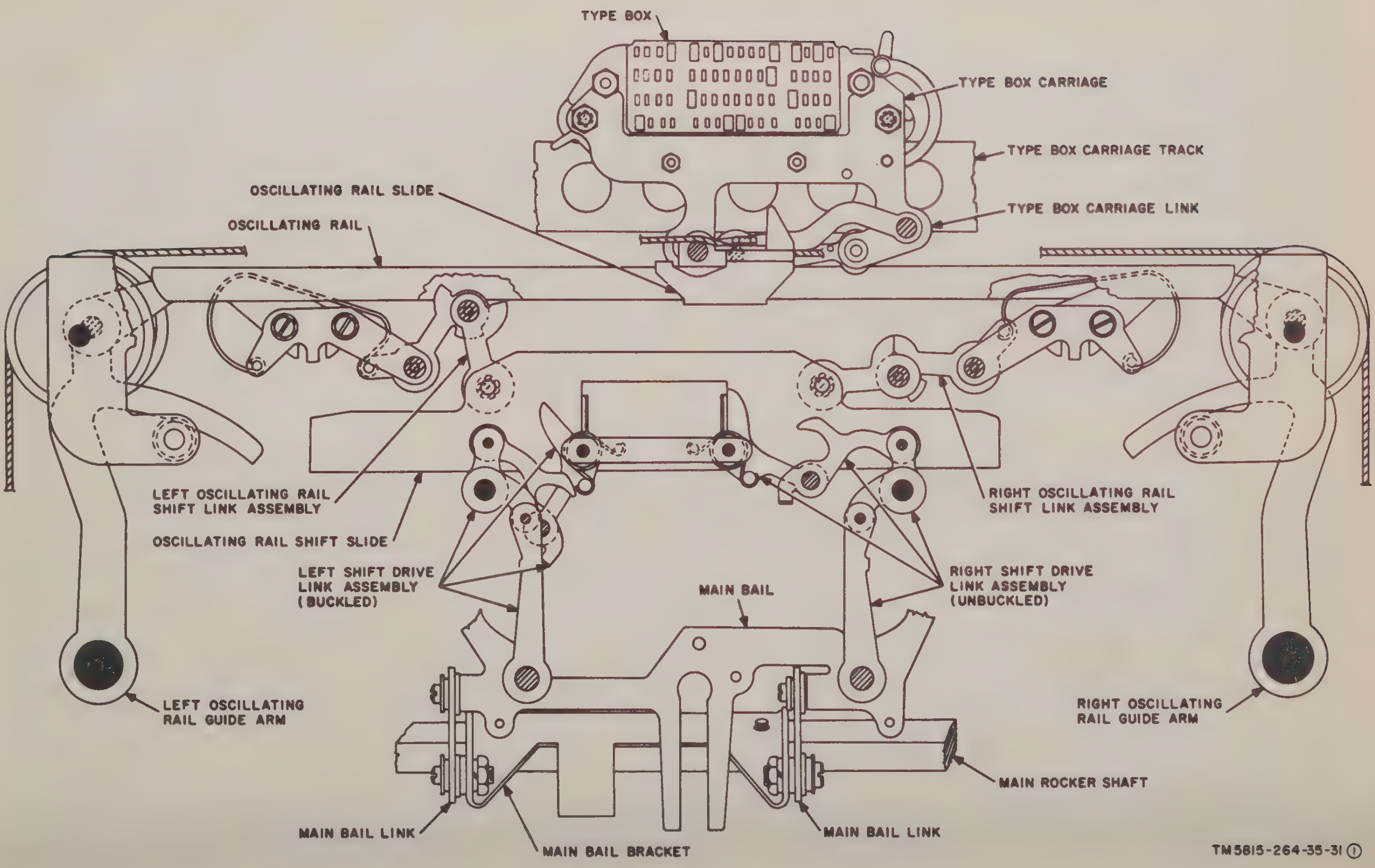
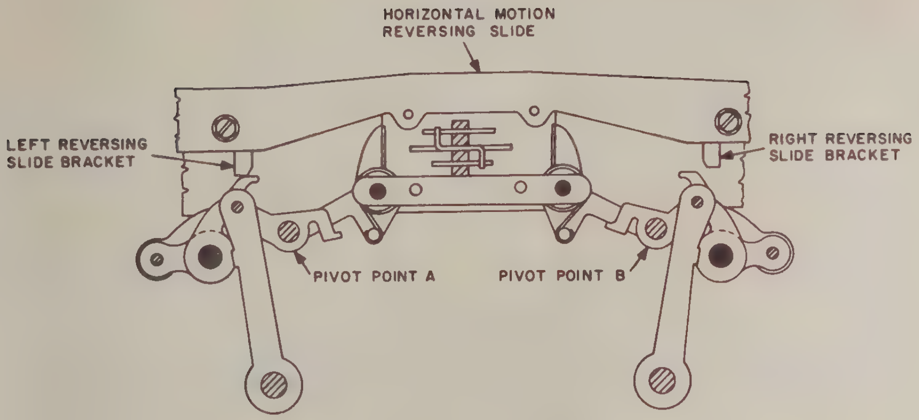
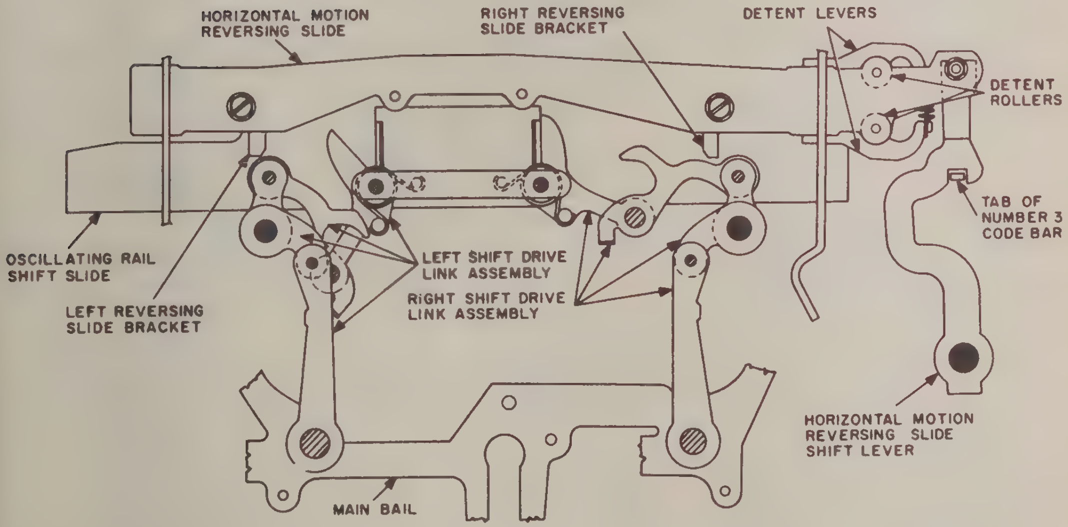

TYPE BOX
TYPE BOX CARRIAGE
TYPE BOX CARRIAGE TRACK
TYPE BOX CARRIAGE LINK
OSCILLATING RAIL SLIDE
OSCILLATING RAIL
LEFT OSCILLATING RAIL SHIFT LINK ASSEMBLY
OSCILLATING RAIL SHIFT SLIDE
LEFT SHIFT DRIVE LINK ASSEMBLY (BUCKLED)
MAIN BAIL
RIGHT OSCILLATING RAIL SHIFT LINK ASSEMBLY
RIGHT SHIFT DRIVE LINK ASSEMBLY (UNBUCKLED)
LEFT OSCILLATING RAIL GUIDE ARM
RIGHT OSCILLATING RAIL GUIDE ARM
MAIN ROCKER SHAFT
MAIN BAIL LINK
MAIN BAIL BRACKET
MAIN BAIL LINK
TM5815-264-35-31 ①

Figure 431①. Front plate horizontal positioning mechanism (part 1 of 3).

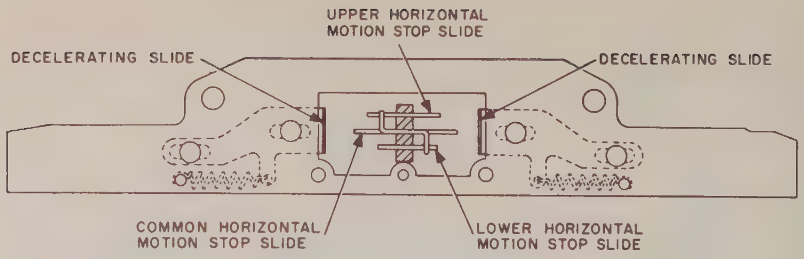

HORIZONTAL MOTION REVERSING SLIDE
LEFT REVERSING SLIDE BRACKET
RIGHT REVERSING SLIDE BRACKET
PIVOT POINT A
PIVOT POINT B

A DRIVE LINK ASSEMBLIES IN UPPER POSITION

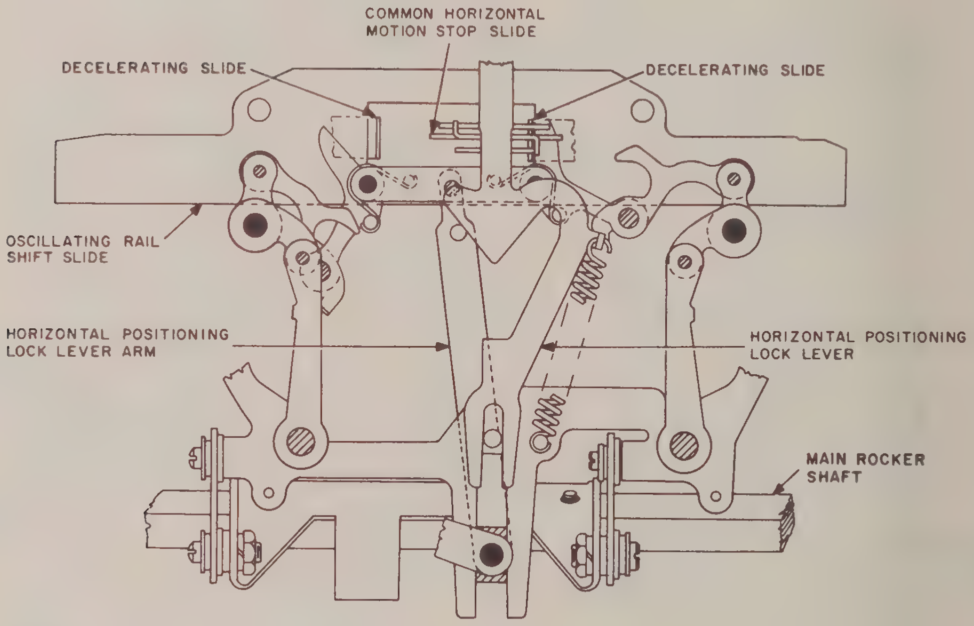

HORIZONTAL MOTION REVERSING SLIDE
RIGHT REVERSING SLIDE BRACKET
DETENT LEVERS
DETENT ROLLERS
TAB OF NUMBER 3 CODE BAR
OSCILLATING RAIL SHIFT SLIDE
LEFT REVERSING SLIDE BRACKET
LEFT SHIFT DRIVE LINK ASSEMBLY
RIGHT SHIFT DRIVE LINK ASSEMBLY
HORIZONTAL MOTION REVERSING SLIDE SHIFT LEVER
MAIN BAIL

B OSCILLATING RAIL SHIFT SLIDE POSITIONED TO LEFT TM5815-264-35-31②

Figure 431②. Front plate horizontal positioning mechanism (part 2 of 3).


UPPER HORIZONTAL MOTION STOP SLIDE
DECELERATING SLIDE
DECELERATING SLIDE
COMMON HORIZONTAL MOTION STOP SLIDE
LOWER HORIZONTAL MOTION STOP SLIDE

C HORIZONTAL MOTION STOP SLIDES


COMMON HORIZONTAL MOTION STOP SLIDE
DECELERATING SLIDE
DECELERATING SLIDE
OSCILLATING RAIL SHIFT SLIDE
HORIZONTAL POSITIONING LOCK LEVER ARM
HORIZONTAL POSITIONING LOCK LEVER
MAIN ROCKER SHAFT

D HORIZONTAL POSITIONING LOCK LEVER

TM5815-264-35-31③

Figure 431③. Front plate horizontal positioning mechanism (part 3 of 3).

mechanism is caused to operate (par. 688). When the type box clutch completes its revolution, it is caused to disengage by the stop lug contacting the trip lever and latch lever. It remains disengaged until reception of the next character causes it to engage and start the sequence of operations once again.

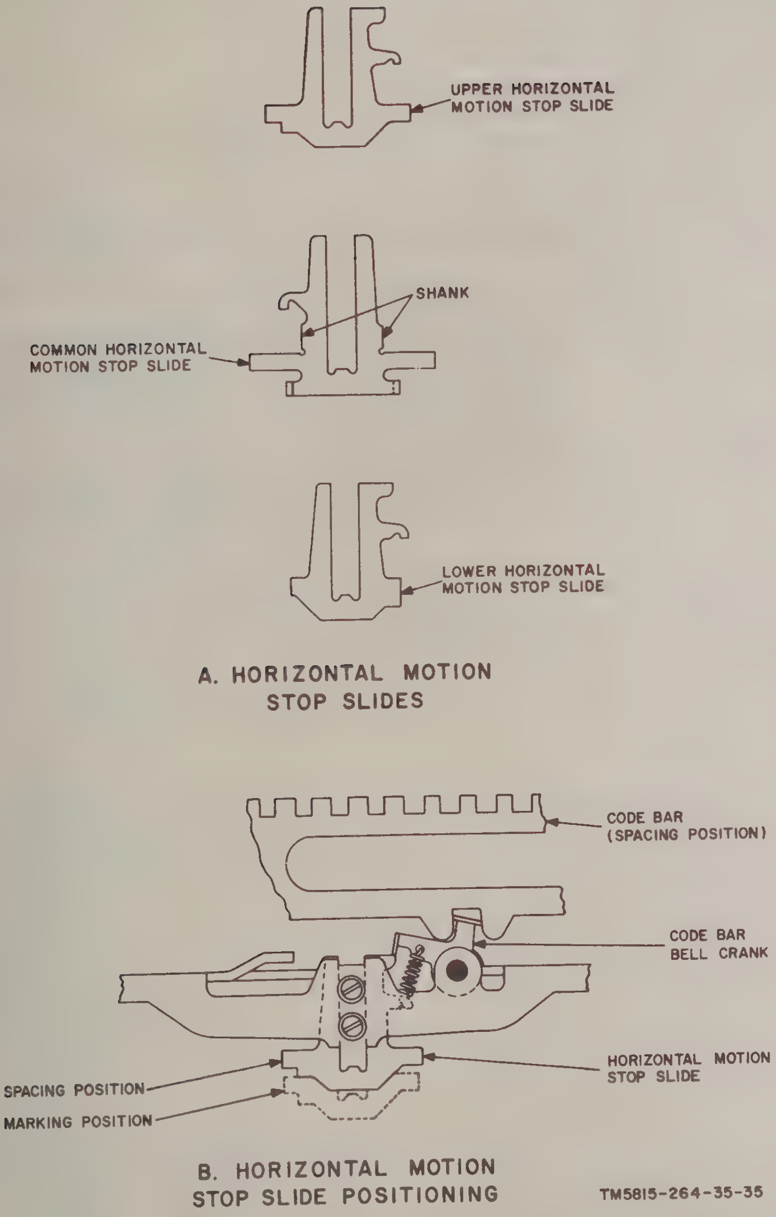

UPPER HORIZONTAL MOTION STOP SLIDE
SHANK
COMMON HORIZONTAL MOTION STOP SLIDE
LOWER HORIZONTAL MOTION STOP SLIDE
A. HORIZONTAL MOTION STOP SLIDES
CODE BAR (SPACING POSITION)
CODE BAR BELL CRANK
HORIZONTAL MOTION STOP SLIDE
SPACING POSITION
MARKING POSITION
B. HORIZONTAL MOTION STOP SLIDE POSITIONING
TM5815-264-35-35

Figure 432. Horizontal motion stop slides and stop slide positioning mechanism.

c. Sequence Chart. The following chart lists the sequence of operations described in *b* above.

Type Box Positioning Sequence Chart

Note. Since the positioning of the code bars in the code bar mechanism has taken place (par. 685), they are prepositioned to the left o right. The number 1, number 2, and common code bars are longer than the others and serve as stops in vertical positioning. The number code bar, through the horizontal motion reversing slide shift lever and the horizontal motion reversing slide, has disabled either the left o right shift drive link assembly to begin motion in a given direction. The number 4 and 5 code bars, through the code bar bell cranks, hav positioned the horizontal motion stop slides to the front or rear.

1 Code bar clutch cam follower arm (on the code bar cam-clutch assembly) rotates the clutch trip shaft.
2 Clutch trip shaft moves the type box clutch trip arm
3 Type box clutch engages and the assembly begins rotating
4 Main rocker shaft moves in a counterclockwise direction (as viewed from the right end)

Note. Since positioning takes place in two planes, steps 5 through 10, consider them separately: (a) steps represent vertical parts positioning; (b) steps represent horizontal parts positioning.

5	(a) Main rocker shaft moves the main rocker shaft bracket and causes the main side lever drive link to move upward.		5	(b) Main rocker shaft moves the main bai drive bracket and drive links.	
6	(a) Main side lever drive link rotates about its pivot so that its forward end moves upward.		6	(b) Main bail drive links pull the main bai downward.	
7	(a) Left and right vertical positioning levers move the type box carriage track upward.	Main side lever follower arm moves the vertical positioning lock lever toward the front.	7	(b) Left or right (undisabled) shift drive lin assemblies initiate motion of the oscillating rail shift slide to left or right an the horizontal positioning lock leve moves down.	
8	(a) The actions given in 7(a) above continue		8	(b) Horizontal positioning lock lever wedg bears against the horizontal positionin lock lever arm, continuing motion to th oscillating rail shift slide in the direction in which it was started.	
9	(a) Projections on the vertical positioning levers contact the lower most extended code bar, stopping the type box carriage track from moving further.	Steps on the vertical positioning lock levers locks the vertical positioning levers momentarily.	9	(b) Oscillating rail shift slide motion stopped by the longest horizontal motion stop slide in its path.	Type box through th oscillating rail an type box carriag link are stopped fro moving further.
10	(a) Type box is positioned vertically to a horizontal row of pallets.		10	(b) Type box is positioned horizontally to vertical row of pallets.	

11 Main rocker shaft is at its lowest point of counterclockwise travel

Note. It is at this point that the print hammer strikes the selected type pallet. It is also at this point that the spacing mechanism (par 688) starts its sequence of operations.

12 Main rocker shaft reverses its movement and moves toward its starting position, as controlled by the typ box assembly eccentric.
13 Parts positioned in steps 5 through 10 above reverse direction and return to their starting positions
14 Type box clutch disengages

Note. At this point the type box mechanism is in a condition to begin the next sequence with the start of step 1 above.

687. Printing Mechanism

a. After the type box has been moved so that the selected type pallet is in position (par. 686), it must be struck by the print hammer in order to print. This is accomplished by the action of the printing carriage located on the printing carriage track. The printing carriage rides (on rollers) on the printing carriage track which is attached to the front plate mechanism. The carriage is clamped to the forward section of the upper wire rope (fig. 428) so that the printing carriage advances to the next printing position along the track in synchronism with the type box.

b. The printing track, which is located on the front of the typing unit (fig. 433) is

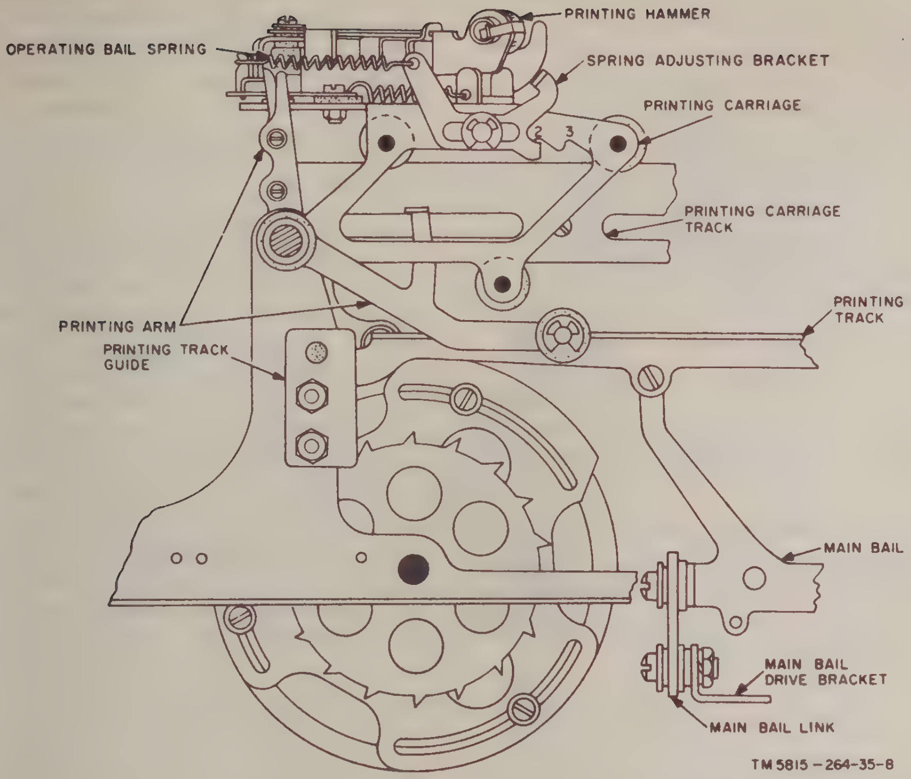

PRINTING HAMMER
OPERATING BAIL SPRING
SPRING ADJUSTING BRACKET
PRINTING CARRIAGE
2
3
PRINTING CARRIAGE TRACK
PRINTING TRACK
PRINTING ARM
PRINTING TRACK GUIDE
MAIN BAIL
MAIN BAIL DRIVE BRACKET
MAIN BAIL LINK
TM 5815-264-35-8

Figure 433. Printing mechanism, front view.

fastened to an extension at each end of the main bail. As the main bail moves downward and upward it extends the down-and-up motion to the printing track which travels in guides at each end of the track. The printing arm, which extends downward from the printing carriage, rides the printing track. The operation of the printing mechanism begins simultaneously with the start of type box positioning (par. 686), so that as the main bail moves downward, it moves the printing track downward. As this happens, the printing arm is carried downward with the printing track and the upper end moves toward the right. As the main bail reaches its downward limit of travel (completion of the type box positioning cycle), the upper end of the printing arm makes contact with the forward projection on the operating bail latch (fig. 434) and causes it to release the print hammer operating bail. The operating bail swings, under its spring tension, in a counterclockwise direction and carries the attached print hammer bail with it until it strikes its stop. (Tension of the operating bail spring can be varied, by means of the operating bail spring adjusting bracket, to vary the striking force of the print hammer for clear printing of multiple copies.) The print hammer bail, in being driven by the operation bail, is swung toward the type box. When the operating bail is stopped, momentum causes the print hammer bail to continue its travel against the print hammer bail spring until the print hammer strikes the selected type pallet. At this point, the main bail reverses its direction and moves upward toward its starting position. As this happens, the printing track and printing arm also reverse their direction. The upper end of the printing arm (fig. 433) then moves toward the left, rotating the print hammer operating bail clockwise against its spring tension, until it becomes latched in place by

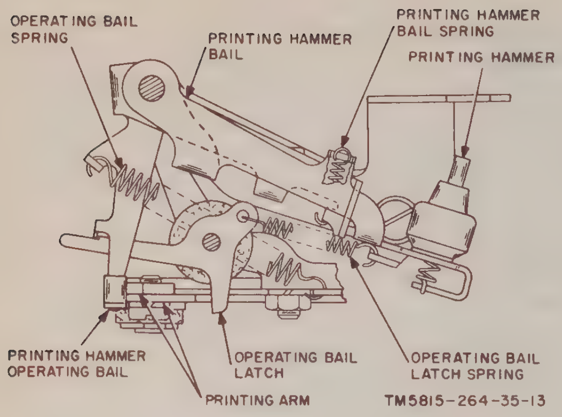


Figure 434. Printing mechanism, top view.

the operating bail latch (fig. 434). As this occurs, the print hammer bail is thus prepared for the start of the next printing sequence.

c. The following chart lists the operating sequence for the printing mechanism.

Printing Sequence Chart

1	Main ball moves the printing track downward	
2	Printing track causes the printing arm to rotate clockwise about its pivot.	
3	The upper end of the printing arm moves to the right and contacts the operating bail latch.	
4	Operating bail is released and swings the print hammer bail toward the type pallet.	
5	Operating bail strikes its stop.	Print hammer strikes the selected type pallet.
6	Main bail moves the printing track upward *Note.* It is at this point that the spacing mechanism begins operation (par. 688) and advances the printing carriage to the next position.	
7	Printing arm moves counterclockwise about its pivot.	
8	The upper end of the printing arm contacts the operating bail and moves it to the left.	
9	Operating bail (and print hammer bail) return to the starting position.	
10	Operating bail latch locks the operating bail in place. *Note.* At this point the next sequence (starting at 1 above) can begin.	

688. Spacing Mechanism

a. General. The spacing mechanism performs two separate operations to control the movement of the type box and printing carriages during printing of messages. It advances the carriages so that proper space is provided between each character that is printed; and it prevents the carriages from advancing (supresses spacing) when certain functions (FIGS, LTRS, etc.) are selected, or when the carriages reach their extreme right positions.

b. Spacing.

(1) As described in paragraph 686*a* and illustrated in figure 428 the printing carriage is connected to a wire rope which, in turn, is fastened between the spring drum and the spacing drum. The purpose of the spring drum, which contains a torsion spring, is to apply tension to the wire rope (thus the carriages) toward the left. The spacing drum has ratchet wheel about its periphery which is engaged by the eccentric-driven spacing feed pawls (fig. 435). The spacing shaft, on which the spacing eccentrics are mounted, is rotated by the spacing shaft driven gear through the spacing shaft driving gear attached to the three-stop spacing clutch on the typing unit main shaft (fig. 378). The ratio between the two gears causes the spacing shaft (fig. 435) to turn one-half of a revolution each time the spacing clutch is tripped. This allows the feed pawls to advance the spacing drum by the amount of one ratchet tooth, thus overcoming the tension of the spring in the spring drum and advancing the wire rope (with the attached carriages) a corresponding distance.

(2) As described in paragraph 686*b*, each time the typing unit prints a character, the main rocker shaft is caused to oscillate about its center. A cam plate, fastened to the lower surface of the main rocker shaft (A, fig. 436) is in its lowest position during the rest time. During the time printing is to take place, the cam is moved upward and causes the spacing trip lever bail to rotate about its pivot point. As this happens, the spacing trip lever bail rotates the spacing trip

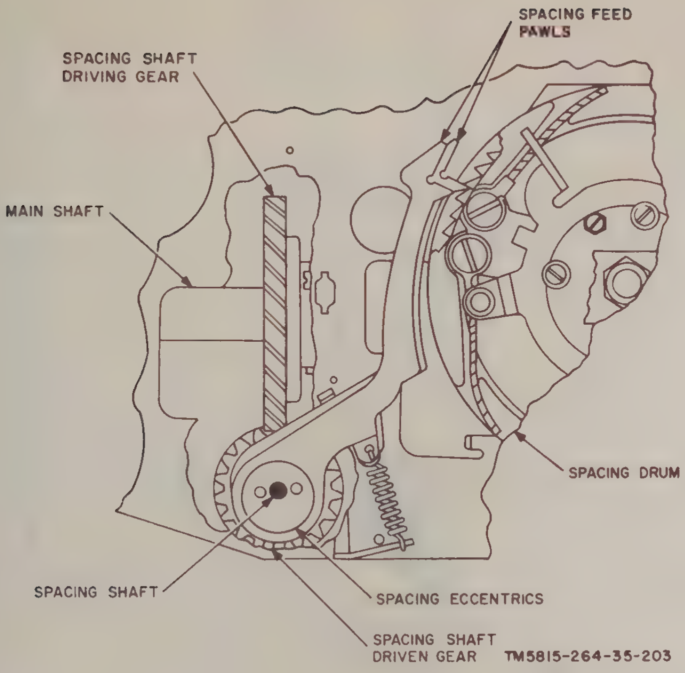
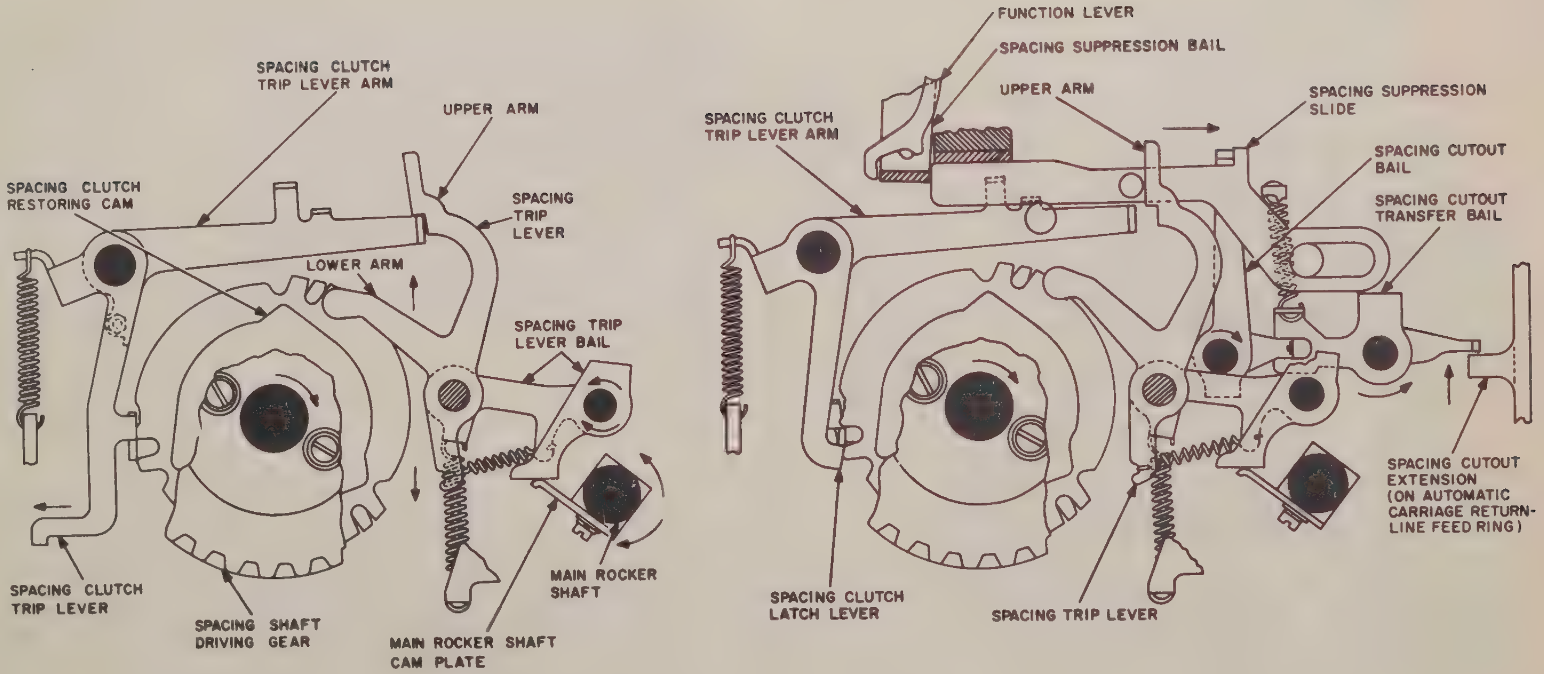

SPACING FEED PAWLS
SPACING SHAFT DRIVING GEAR
MAIN SHAFT
SPACING DRUM
SPACING SHAFT
SPACING ECCENTRICS
SPACING SHAFT DRIVEN GEAR
TM5815-264-35-203

Figure 435. Spacing drum drive mechanism.

lever until its upper arm latches with the spacing clutch trip lever arm. When the main rocker shaft reverses its direction of movement, the spacing trip lever bail and trip lever move downward to their starting positions. This, in turn, causes the latched spacing clutch trip lever arm to move the spacing clutch trip lever away from the stop lug, thus engaging the clutch. Before the spacing clutch completes one third of a revolution, the spacing clutch restoring cam bears against the lower arc of the spacing trip lever causing it to rotate about its pivot point until it releases the spacing clutch trip lever arm. This then, releases the spacing clutch trip lever which returns to its normal (at rest) position to stop the clutch after one third of a revolution. The spacing clutch cam disk has an indent at each of the three stop positions. When one of the three lugs on the clutch shoe lever disk strikes the spacing clutch trip lever, the inertia of the cam disk assembly causes it to continue in the direction of travel until its lugs make contact with the lugs on the clutch shoe lever disk. At this point, the latch lever (B, fig. 436) drops into an indent in the cam and the clutch is held disengaged until the next sequence begins.


SPACING CLUTCH TRIP LEVER ARM
UPPER ARM
SPACING CLUTCH RESTORING CAM
SPACING TRIP LEVER
LOWER ARM
SPACING TRIP LEVER BAIL
SPACING CLUTCH TRIP LEVER
SPACING SHAFT DRIVING GEAR
MAIN ROCKER SHAFT
MAIN ROCKER SHAFT CAM PLATE
FUNCTION LEVER
SPACING SUPPRESSION BAIL
UPPER ARM
SPACING SUPPRESSION SLIDE
SPACING CLUTCH TRIP LEVER ARM
SPACING CUTOUT BAIL
SPACING CUTOUT TRANSFER BAIL
SPACING CUTOUT EXTENSION (ON AUTOMATIC CARRIAGE RETURN-LINE FEED RING)
SPACING CLUTCH LATCH LEVER
SPACING TRIP LEVER

A. SPACING MECHANISM

B. SPACING SUPPRESSION MECHANISM

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Figure 436. Spacing and spacing suppression mechanism.

c. Spacing Sequence Chart. The following chart lists the sequence of operations that occur when spacing between printed characters:

Spacing Sequence Chart

1	Main rocker shaft moves upward		
2	Rocker shaft cam plate moves the spacing trip lever bail about its pivot		
3	Spacing trip lever bail moves the spacing trip lever		
4	The upper arm of the spacing trip lever latches with the spacing clutch trip lever arm		
5	Main rocker shaft reverses direction and moves the cam plate downward		
6	Spacing trip lever bail and trip lever move downward to their starting positions		
7	Spacing clutch trip lever arm moves the spacing clutch trip lever away from the stop lug of the clutch		
8	Clutch engages and rotates the spacing shaft driving gear.	Spacing shaft driven gear rotates the spacing eccentrics.	Spacing feed pawls advance the spacing drum (and wire rope).
9	Restoring cam moves the spacing trip lever		
10	Spacing trip lever releases the spacing clutch trip lever arm		
11	Spacing clutch trip lever arm allows the spacing clutch trip lever to return to its normal position		
12	Clutch shoe lug strikes the clutch trip lever		
13	Spacing clutch latch lever drops into the indent of the clutch cam		
14	Spacing clutch disengages until the next sequence is begun (step 1 above)		

d. Spacing Suppression. When certain functions are selected or when the carriages reach their extreme right positions, it is necessary to interrupt or suppress the spacing action. This is accomplished by moving the spacing suppression slide (B, fig. 436) forward. In this position a stud on the slide it holds the upper arm of the spacing trip lever forward, preventing it from engaging the spacing clutch trip lever arm, hence spacing (*b* above) does not occur. In the case of spacing suppression when functions are selected, the spacing suppression slide is moved forward by the spacing suppression bail. (The manner in which this bail is operated is discussed in par. 691*d*.) When the printing carriage is near its extreme right position, an adjustable spacing cutout extension engages the spacing cutout transfer bail (fig. 428). This, in turn, operates the spacing cutout bail. The spacing cutout bail shifts the spacing suppression slide forward (B, fig. 436) and prevents spacing (as given above) until the printing carriage is returned to the left margin. The maximum number of characters which the typing unit may print is eighty-five; therefore several ratchet teeth have been omitted from the spacing drum to prevent spacing (or advancing the wire rope) beyond this point.

689. End-of-Line Indicator Mechanism (Page Copy)

a. The end-of-line indicator mechanism functions to operate a lamp to warn the operator that the end of a printed line is being approached. The mechanism consists of an end-of-line indicator switch S9, lever, and spring, mounted by means of a bracket to the keyboard base (fig. 437). It is actuated by a cam disk attached to the spring drum of the typing unit. The switch is made operable only when the keyboard control is in the K or K-T positions.

b. The end-of-line indicator switch S9 is of the normally-closed type. It is held in the open condition by the end-of-line indicator switch lever through the tension of its associated spring. Since the spring drum rotates due to the printing and spacing action, the end-of-line indicator cam disk is moved with it. As the end of a printed line is approached, the cam surface of the disk makes contact with the end-of-line indicator switch lever and rotates it about its pivot. This, in turn, causes the left end of the lever to move upward and away from the plunger of the switch. As this happens, the switch closes and completes the circuit to the lamp on the cabinet, causing it to glow. (See par. 711*a* for end-of-line indicator circuit theory.) When the carriage is returned to the left margin (par. 694), the cam disk in following the reverse rotation of the spring drum, is moved away from the switch lever. As a result, the above process is reversed, and the switch opens. The angular position of the cam disk with respect to the spring drum (fig. 428)

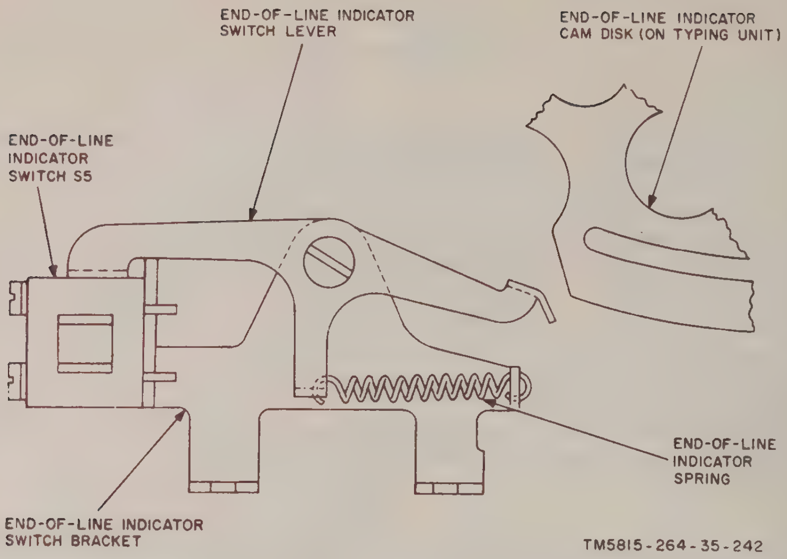

END-OF-LINE INDICATOR SWITCH LEVER
END-OF-LINE INDICATOR CAM DISK (ON TYPING UNIT)
END-OF-LINE INDICATOR SWITCH S5
END-OF-LINE INDICATOR SPRING
END-OF-LINE INDICATOR SWITCH BRACKET
TM5815-264-35-242

Figure 437. End-of-line indicator mechanism, page copy.

can be adjusted to change the point at which the end-of-line indicator lamp will light.

c. The following chart lists the sequence of operations for the end-of-line indicator mechanism.

End-of-line Sequence Chart

1	Spring drum rotates and moves the end-of-line indicator cam disk.
2	Cam disk contacts the end-of-line indicator switch lever (normally at the 66th character).
3	Switch lever rotates about its pivot and releases the switch plunger.
4	Switch S9 closes the circuit to the lamp in the cabinet, causing it to light.
5	Carriage is returned to the left margin.
6	End-of-line indicator cam disk moves away from the switch lever.
7	End-of-line indicator switch lever (under tension of its spring) depresses the switch plunger.
8	Switch S9 opens and the end-of-line indicator lamp goes out.

690. Ribbon Mechanism

a. General. The ribbon mechanism consists of two (left and right) sections, located on each side frame of the typing unit. The ribbon mechanism follows the oscillating (up and down) movement of the main side lever (fig. 430) through the ribbon drive links. It functions during the upward movement to position the typing ribbon properly for printing. During the downward movement, the mechanism withdraws the ribbon so that the last character printed can be viewed. This up and down movement also causes the ribbon to be fed and reversed to maintain an even amount of wear along its entire length. The ribbon is held in place at the point of printing by ribbon guides fastened to the rear of the type box carriage.

b. Ribbon Feeding. Each section of the ribbon mechanism includes a spool bracket (hinged at its rear edge) upon which the ribbon spool shaft is mounted (figs. 438 and 439). A ribbon tension bracket (fig. 438) is keyed to the lower end of the ribbon spool shaft. A ribbon ratchet wheel is mounted on the ribbon spool shaft just below the ribbon spool bracket, from which it is separated by a friction washer. The ratchet wheel friction spring on the underside of the ratchet wheel causes the ribbon ratchet wheel to bear against the friction washer. This applies a constant drag to the ratchet wheel. The ribbon tension plate is keyed to the hub of the

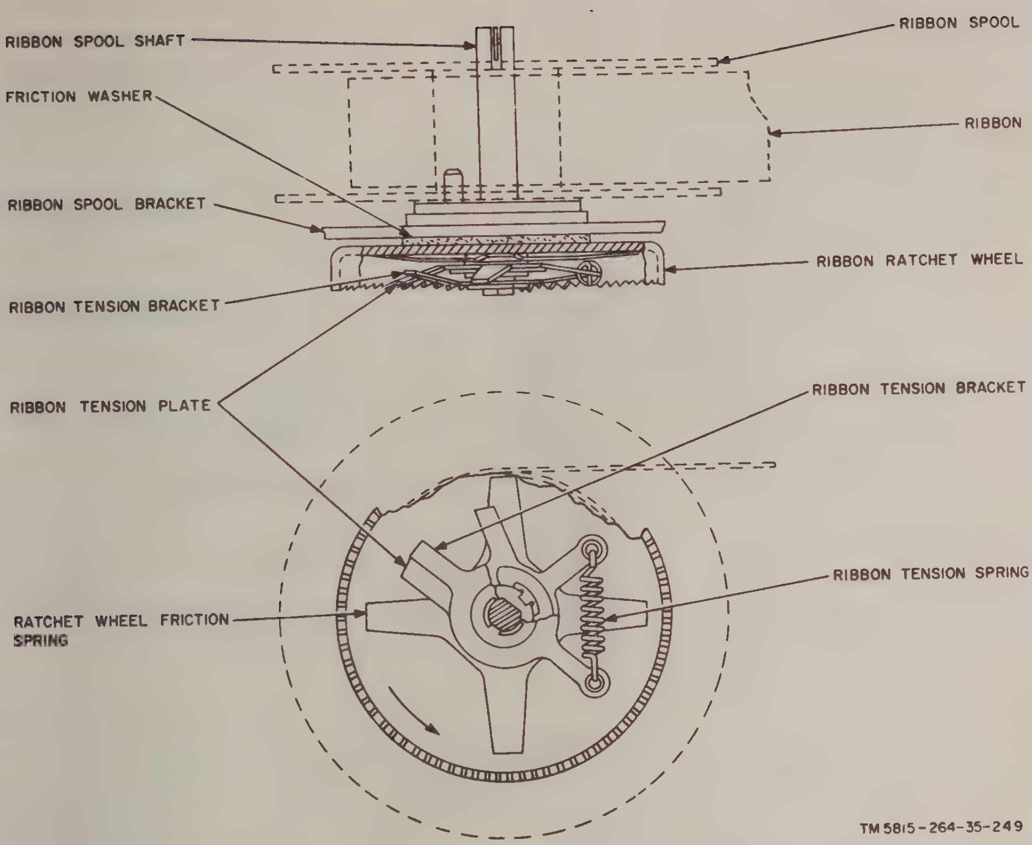
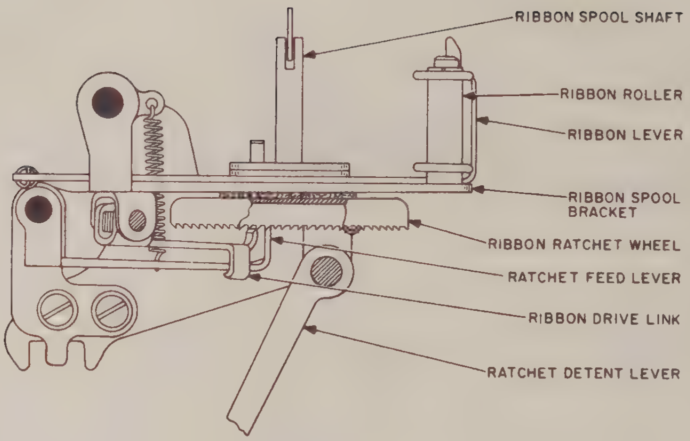

RIBBON SPOOL SHAFT
RIBBON SPOOL
FRICTION WASHER
RIBBON
RIBBON SPOOL BRACKET
RIBBON RATCHET WHEEL
RIBBON TENSION BRACKET
RIBBON TENSION PLATE
RIBBON TENSION BRACKET
RIBBON TENSION SPRING
RATCHET WHEEL FRICTION SPRING
TM 5815-264-35-249

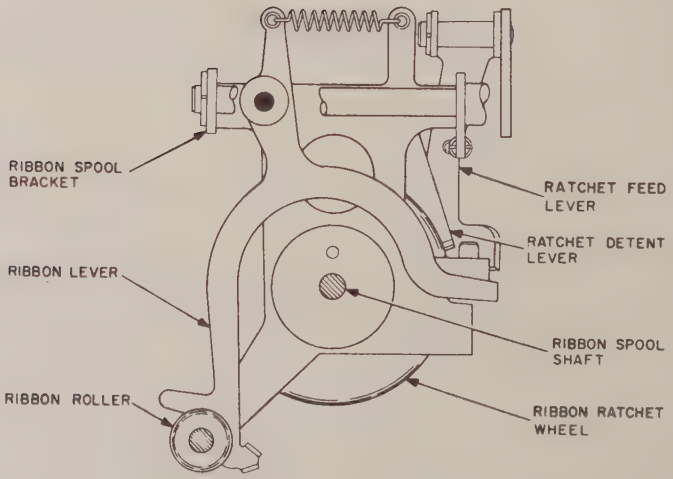
Figure 438. Ribbon tension mechanism, left side.

ribbon ratchet wheel. It has two projecting lugs (points A and B of fig. 438), that straddle the lug on the ribbon tension bracket. The ribbon tension spring tends to keep the ribbon tension bracket against lug A of the ribbon tension plate. As the ribbon drive link moves upward, it causes the ribbon spool bracket to rotate upward about its pivot (point A, fig. 439). The ratchet feed and ratchet detent levers pivot about points B and C, respectively. They are normally held against the sawtooth-shaped teeth of the ratchet wheel by their springs, but, as the ribbon spool bracket is moved upward, the ratchet feed lever skips over one tooth, while the ratchet detent lever holds the ribbon ratchet wheel from turning backward. After the character has been imprinted on the paper, the ribbon spool bracket moves downward and the ratchet feed lever engages a ratchet tooth and pushes the ratchet wheel. A tooth on the ratchet wheel then skips over the ratchet detent lever. As the ribbon ratchet wheel turns, the ribbon tension plate also turns and extends the ribbon tension spring (fig. 438). When the lug of the ribbon tension plate (point B) makes contact with the ribbon tension bracket, the ribbon spool shaft is made to turn. This, in turn, causes a small amount of ribbon to be wound from one spool (left or right) onto the other. The above action occurs repeatedly until the ribbon reversing mechanism is caused to operate (*d* below).

c. Ribbon Feed Sequence Chart. The chart given below lists the sequence of operations that occur when the ribbon mechanism is feeding in either the right or left direction.


RIBBON SPOOL SHAFT
RIBBON ROLLER
RIBBON LEVER
RIBBON SPOOL BRACKET
RIBBON RATCHET WHEEL
RATCHET FEED LEVER
RIBBON DRIVE LINK
RATCHET DETENT LEVER

A. LEFT SIDE VIEW


RIBBON SPOOL BRACKET
RIBBON LEVER
RIBBON ROLLER
RATCHET FEED LEVER
RATCHET DETENT LEVER
RIBBON SPOOL SHAFT
RIBBON RATCHET WHEEL

B. LEFT TOP VIEW

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Figure 439. Ribbon mechanism.

Ribbon Feed Sequence Chart

1	Ribbon drive links move upward	
2	Ribbon spool bracket rotates upward about its pivot.	
3	Ratchet feed lever rotates about its pivot.	Ratchet detent lever rotates about its pivot.
4	Ratchet feed lever skips one tooth of the ribbon ratchet wheel.	Ratchet detent lever holds the ribbon ratchet wheel from moving backward.
5	Ribbon drive links move downward	
6	Ribbon spool bracket moves downward	
7	Ratchet feed lever moves downward.	Ratchet detent lever moves downward.
8	Ratchet feed lever engages a tooth on the ribbon ratchet wheel.	Tooth on the ratchet wheel skips the ratchet detent lever.
9	Ribbon ratchet wheel and ribbon tension plate turn.	
10	Ribbon tension spring extends	
11	Ribbon tension plate lug contacts the ribbon tension bracket.	
12	Ribbon spool shaft turns and winds a portion of ribbon from the opposite spool.	

d. Ribbon Reversing. The teeth on the left and right ribbon ratchet wheels face in opposite directions so that (when the associated feed levers are engaged) the left ribbon ratchet wheel turns clockwise and the right ribbon ratchet wheel turns counterclockwise (when viewed from the top). In order for the ribbon to be wound from one spool to the other, only one section (left or right) of the ribbon mechanism can have its ratchet feed and ratchet detent levers engaged with its ratchet wheel at a given time. When the ribbon becomes completely wound on one spool, the levers must be disengaged from the ratchet wheel of the full spool and the levers of the empty spool must become engaged. While the ribbon is passing from the left spool to the right spool, the right set of levers are engaged. The left set are held disengaged against the tension of their springs by the left ribbon reverse lever which is in its downward position (fig. 440). The left ribbon reverse lever is held in this position by means of the ribbon reverse detent lever through the ribbon reverse detent cam, ribbon reverse shaft, and ribbon reverse spur gear. As the ribbon is unwound from the left ribbon spool, it passes around the ribbon roller, and through a slot in the ribbon lever (B, fig. 439). When the ribbon approaches the end of the ribbon spool, an eyelet (contained in the ribbon) catches in the ribbon lever slot and pulls the lever to the right. The next time the ribbon mechanism is moved upward, the displaced ribbon lever engages the end of the left ribbon reversing lever and causes it to move the position shown (by dashed lines) in figure 440. As the lever moves, its teeth rotate the left spur gear which, through the ribbon reverse shaft, also turns the detent cam and the right spur gear. The right spur gear, in turn, moves the right ribbon reversing lever downward. As this happens, a pin on the lever drives the right ribbon feed reverse lever downward to disengage the ratchet feed and ratchet detent levers from the right ribbon ratchet wheel. At the same time, a pin on the left ribbon reversing lever moves the left ribbon feed reverse lever upward to permit the left ratchet feed and detent levers to engage the left ribbon ratchet wheel. Thus the ribbon mechanism is positioned to rewind the ribbon to the left spool. When it nears its end on the right ribbon spool, the ribbon will again be reversed in a manner similar to that just described. During the reversing cycle, the ribbon is kept taut by the previously extended ribbon tension spring (fig. 438).

e. Ribbon Reversing Sequence Chart. The sequence chart given below lists the operations that occur when the ribbon feeding is reversed from the right spool to the left spool. The reversing action from the left to the right spools is similar but parts opposite those given in the chart perform the actions (left becomes right and right becomes left).

Ribbon Reversing Sequence Chart

Note. Before the operations given below are begun, it must be assumed that the ribbon eyelet has moved the left ribbon lever to the right.

1	Ribbon drive link moves the ribbon mechanism upward (*b* above).	
2	Left ribbon lever engages the left ribbon reversing lever.	
3	Left ribbon reversing lever moves upward, rotating the left ribbon reverse spur gear.	
4	Ribbon reverse shaft and detent cam rotate	
5	Right spur gear moves the right ribbon reversing lever downward.	Left spur gear moves the left ribbon reversing lever upward.

Ribbon Reversing Sequence Chart—Continued

6	Right ribbon feed reverse lever moves downward.	Left ribbon feed reverse lever moves upward.
7	Right ratchet feed and ratchet detent levers disengage.	Left ratchet feed and ratchet detent levers engage.
8	Ribbon mechanism moves downward	
9	Left ratchet feed lever engages a tooth on the left ribbon ratchet wheel.	Left ratchet detent lever skips a tooth on the ratchet wheel.
10	Left ribbon ratchet wheel and tension plate turn.	
11	Left ribbon tension spring extends	
12	Left ribbon tension plate lug contacts the left ribbon tension bracket.	
13	Left ribbon spool shaft turns and winds a portion of ribbon onto the spool.	

Note. The ribbon will continue to wind onto the left spool following the sequence given in *c* above until the ribbon eyelet moves the right ribbon lever to the left. At this point, the operations given in step 1 above will occur, but to the parts on the opposite side.

691. Functions

a. The operations performed within the typing unit are divided into two classifications. First, there are those which are directly concerned with the actual imprinting of a character; they have been discussed in the preceding paragraphs. Secondly, there are those which result in some mechanical change to produce an action (other than printing) or function. Since functions begin in the same manner, their general operation is described in the subparagraphs below.

b. As in printing, the reception of a code combination positions the code bars in accord-

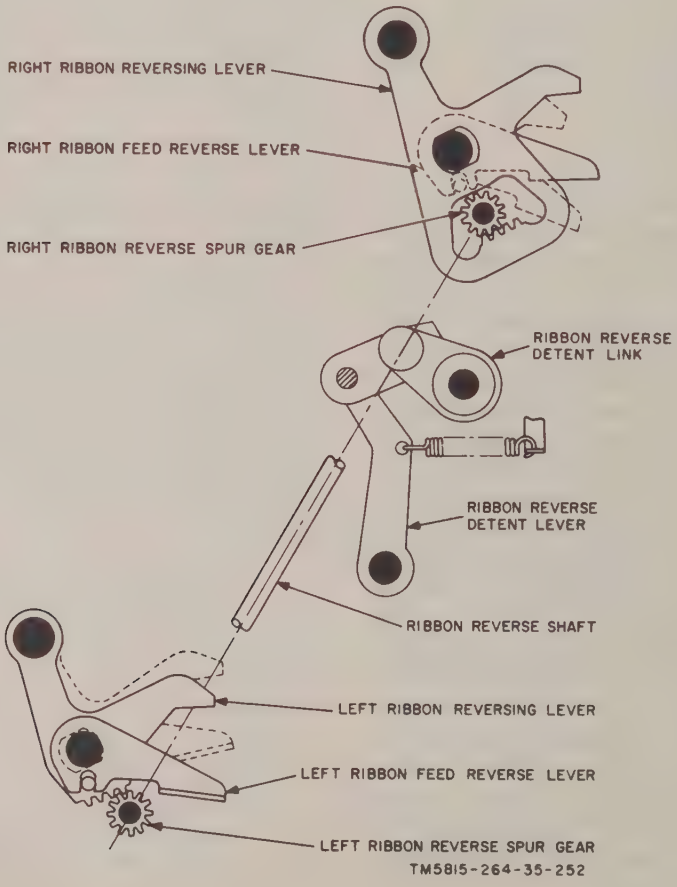

RIGHT RIBBON REVERSING LEVER
RIGHT RIBBON FEED REVERSE LEVER
RIGHT RIBBON REVERSE SPUR GEAR
RIBBON REVERSE DETENT LINK
RIBBON REVERSE DETENT LEVER
RIBBON REVERSE SHAFT
LEFT RIBBON REVERSING LEVER
LEFT RIBBON FEED REVERSE LEVER
LEFT RIBBON REVERSE SPUR GEAR
TM5815-264-35-252

Figure 440. Ribbon reversing mechanism.

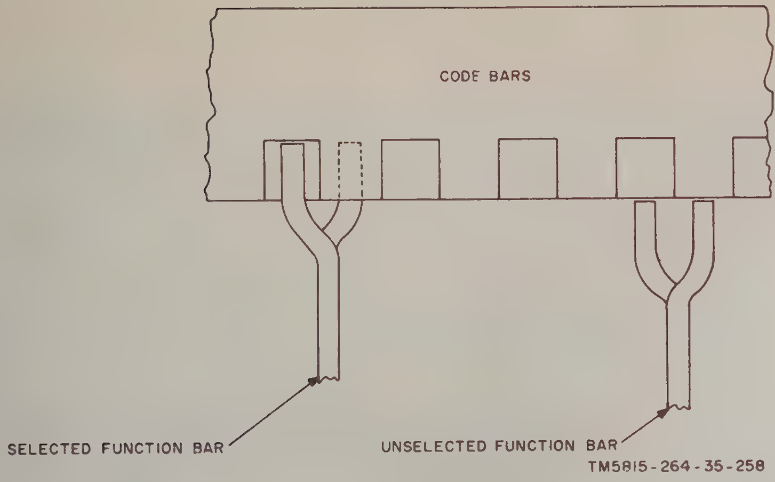
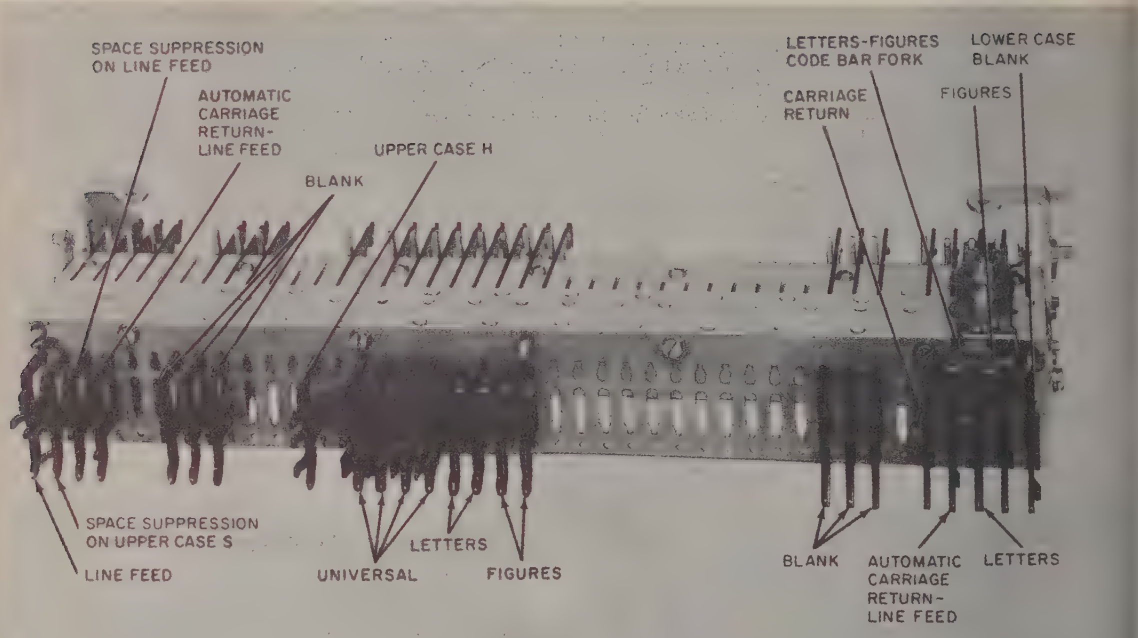


Figure 441. Function selection.

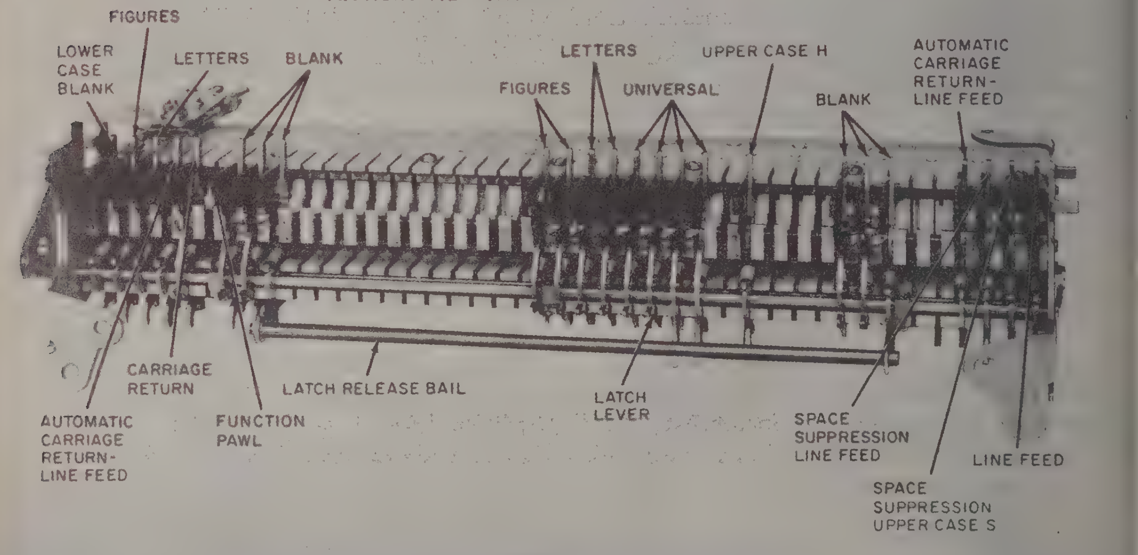
ance with the marking and spacing impulses of the received signal. A series of square notches extends across the rear edge of each code bar. The function box (fig. 442) containing a number of function bars, is positioned directly behind the code bar mechanism in the typing unit. The front edge of each function bar contains a series of tines which are offset to one side or the other. After the code bars have been positioned, the function bars are brought to bear against the code bars. Only the function bar with the proper arrangement of tines will be able to enter the notches in the code bars; all others will be blocked by one or more code bars.

c. When the function clutch is tripped (par. 685*c* and fig. 429) it rotates and imparts motion to the function bar reset bail (A, fig. 443) through the intervening function, roller, cam follower arm, function rocker shaft, and function reset bail spring, causing the function bar reset bail (with its blade) to move forward to allow the spring tensioned function bars to be pulled against the code bars. If the code bars are positioned to select a particular function, each tine on the function bar to be selected will be opposite a notch in the code bars. This will permit the selected function bar to enter the recesses in the code bars, but the other function bars are blocked by one or more code bars (fig. 441). The selected function bar then engages its associated function pawl and function lever (A, fig. 443).

d. In the unselected condition, a function pawl is not engaged by its function bar but is in the forward position where its rear end rests on the upper (rear) projection of the function bar (B, fig. 443). When the function bar reset bail blade releases the function bars and the selected function bar (A, fig. 443) moves forward, the function pawl drops off the projection of the function bar. As the reset bail blade returns the selected function bar to the rear, the engaged function pawl is carried to the rear and pivots the function lever clockwise. A projection on the lower end of most function levers engages the space suppression bail and pushes the bail forward to suppress spacing (par. 688*d*). This extension of the function lever is omitted when spacing on a function is desired. Near the end of the function cycle, the stripper blade (fig. 444), operated by an eccentric assembly and driving link on the function clutch assembly, rises beneath the rear edge of any selected function pawl and strips it from its function bar. Springs return the released function pawl and the function lever to their original position (B, fig. 443). It should be noted that, to prevent printing during the function cycle, whenever a function selection occurs the type box is positioned in such a manner that the print hammer strikes


SPACE SUPPRESSION ON LINE FEED
AUTOMATIC CARRIAGE RETURN-LINE FEED
UPPER CASE H
BLANK
LETTERS-FIGURES CODE BAR FORK
LOWER CASE BLANK
CARRIAGE RETURN
FIGURES
SPACE SUPPRESSION ON UPPER CASE S
LINE FEED
UNIVERSAL
LETTERS
FIGURES
BLANK
AUTOMATIC CARRIAGE RETURN-LINE FEED
LETTERS

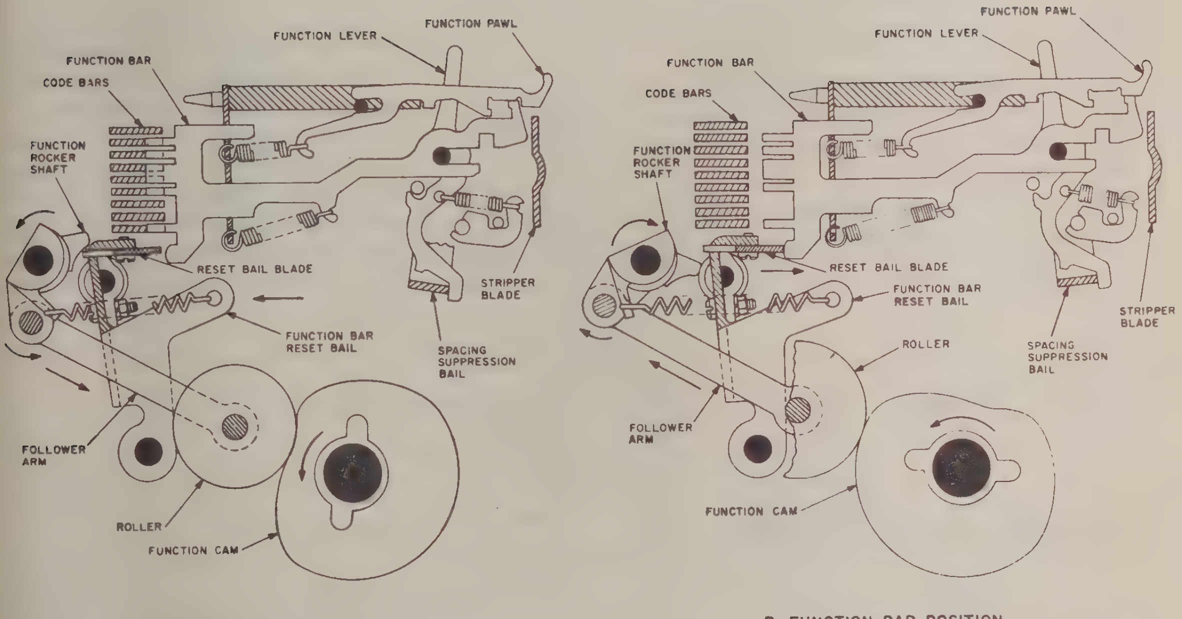
A. FRONT VIEW SHOWING FUNCTION BARS


FIGURES
LOWER CASE BLANK
LETTERS
BLANK
LETTERS
UPPER CASE H
AUTOMATIC CARRIAGE RETURN-LINE FEED
FIGURES
UNIVERSAL
BLANK
CARRIAGE RETURN
LATCH RELEASE BAIL
LATCH LEVER
AUTOMATIC CARRIAGE RETURN-LINE FEED
FUNCTION PAWL
SPACE SUPPRESSION LINE FEED
LINE FEED
SPACE SUPPRESSION UPPER CASE S

B. REAR VIEW SHOWING FUNCTION LEVERS

TM5815-264-35-57

Figure 442. Function box, front and rear views.


FUNCTION PAWL
FUNCTION LEVER
FUNCTION BAR
CODE BARS
FUNCTION ROCKER SHAFT
RESET BAIL BLADE
STRIPPER BLADE
FUNCTION BAR RESET BAIL
SPACING SUPPRESSION BAIL
FOLLOWER ARM
ROLLER
FUNCTION CAM
FUNCTION PAWL
FUNCTION LEVER
FUNCTION BAR
CODE BARS
FUNCTION ROCKER SHAFT
RESET BAIL BLADE
FUNCTION BAR RESET BAIL
STRIPPER BLADE
ROLLER
SPACING SUPPRESSION BAIL
FOLLOWER ARM
FUNCTION CAM

A. SELECTED FUNCTION BAR

B. FUNCTION BAR POSITION AFTER RESET OPERATION

TM5815-264-35-259

Figure 443. Function reset bail driving mechanism and function box mechanism.

where no type pallet is contained (fig. 427). The function clutch is disengaged upon completion of one revolution.

e. The following chart lists the sequence of operations that occur when a function is selected.

Function Sequence Chart

Note. Before the following sequence begins, the particular function code has been received and the code bars in the code bar mechanism have been set to the appropriate (marking or spacing) positions (par. 685*c*).

---

1 Function clutch engages and rotates
2 Function clutch assembly rotates eccentric assembly and function cam
3 Function cam moves the follower arm and rocker shaft
4 Function rocker shaft moves the function bar reset bail
5 Reset bail blade releases all function bars
6 Selected function bar moves forward into the recesses of the code bars (unselected code bars are blocked by the teeth on the code bars).
7 Selected function bar engages the associated function pawl by permitting it to drop onto the upward projection.
8 Reset bail blade returns the selected function bar to the rear position

9	Engaged function pawl is moved to the rear.	Function lever moves clockwise about its pivot.	Lower projection the function lever pushes the suppression bail forward (par. 688*d*).
10	Selected function is put into operation		
11	Eccentric assembly moves the driving link upward		
12	Stripper blade lifts the rear edge of the function pawl, moving it out of engagement with the selected function bar.		
13	Function pawl and the associated function lever return to their original positions		
14	Function clutch disengages		

692. Letters and Figures Shift Function

a. The letters and figures shift function controls various parts to effect the positioning of the left (letters) or right (figures) section of the type box for printing.

b. The letters and figures function bars, pawls, and levers, which are located near the right end of the function box, operate on reception of the letters and figures codes, respectively. The upper ends of the function levers engage the letters-figures function slides (fig. 445). The front ends of these function slides have camming surfaces which, when a slide is shifted to the rear by its function lever, move the letters-figures code bar fork to the right

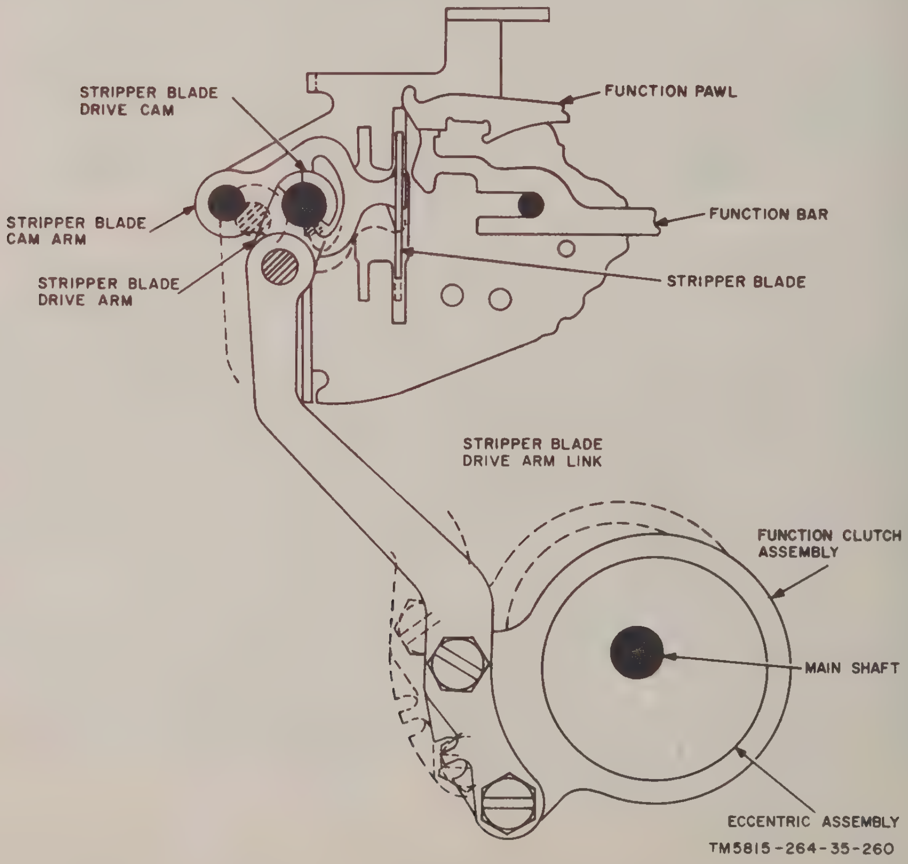
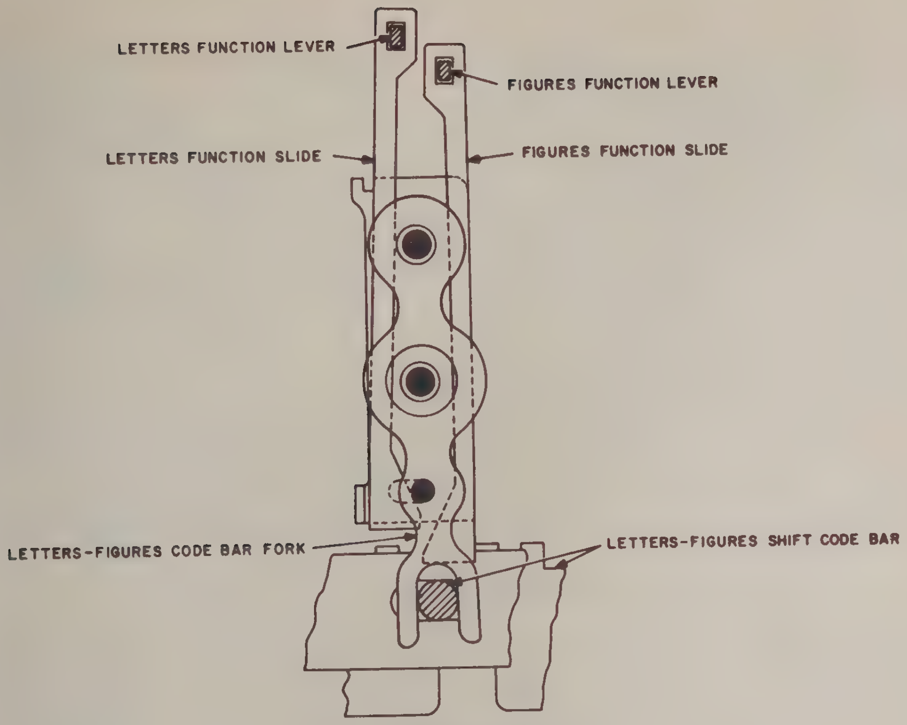
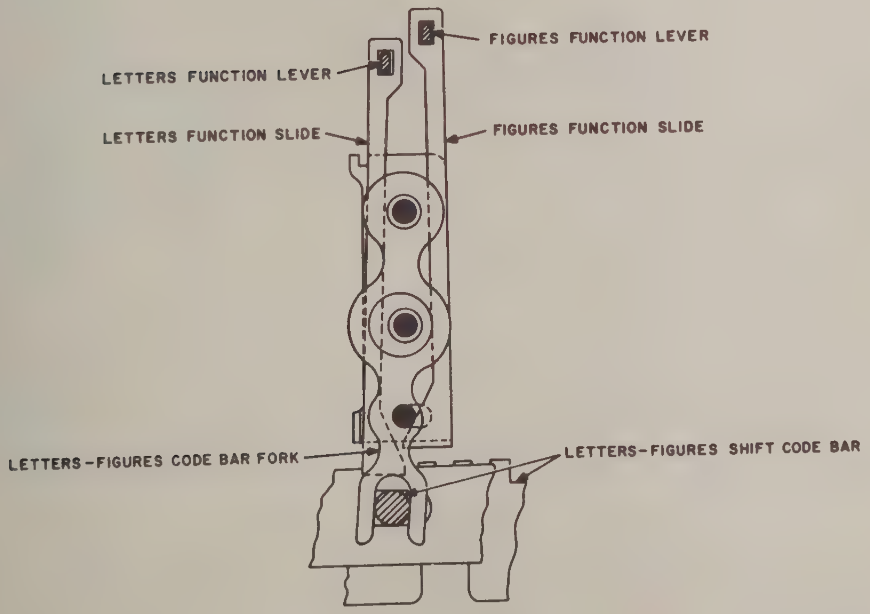

STRIPPER BLADE DRIVE CAM
FUNCTION PAWL
STRIPPER BLADE CAM ARM
FUNCTION BAR
STRIPPER BLADE DRIVE ARM
STRIPPER BLADE
STRIPPER BLADE DRIVE ARM LINK
FUNCTION CLUTCH ASSEMBLY
MAIN SHAFT
ECCENTRIC ASSEMBLY
TM5815-264-35-260

Figure 444. Stripper blade driving mechanism.


LETTERS FUNCTION LEVER
FIGURES FUNCTION LEVER
LETTERS FUNCTION SLIDE
FIGURES FUNCTION SLIDE
LETTERS-FIGURES CODE BAR FORK
LETTERS-FIGURES SHIFT CODE BAR

A. LETTERS SELECTION


FIGURES FUNCTION LEVER
LETTERS FUNCTION LEVER
LETTERS FUNCTION SLIDE
FIGURES FUNCTION SLIDE
LETTERS-FIGURES CODE BAR FORK
LETTERS-FIGURES SHIFT CODE BAR

B. FIGURES SELECTION

TM 5815-264-35-262

Figure 445. Letters-figures function slides.

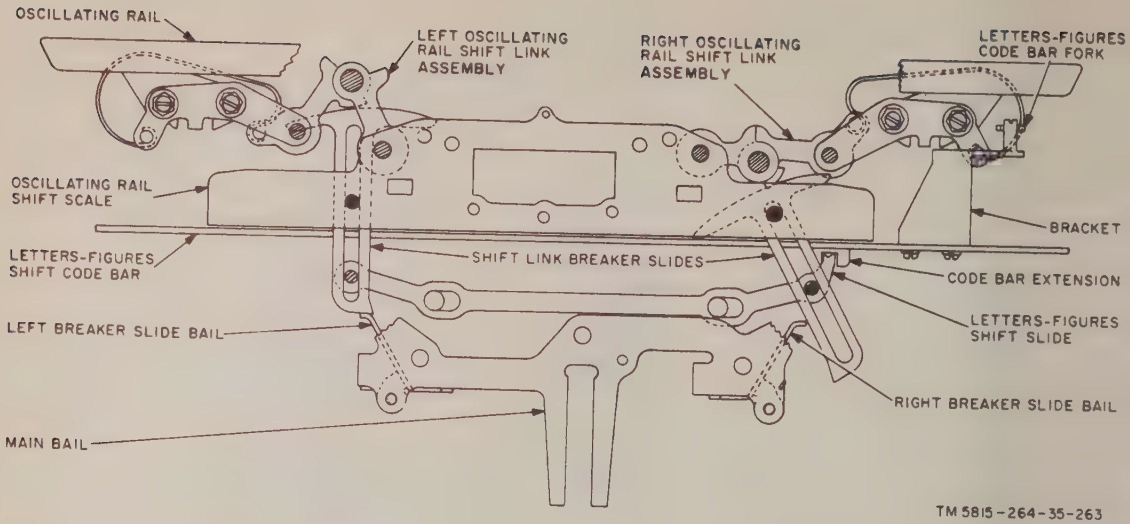

OSCILLATING RAIL
LEFT OSCILLATING RAIL SHIFT LINK ASSEMBLY
RIGHT OSCILLATING RAIL SHIFT LINK ASSEMBLY
LETTERS-FIGURES CODE BAR FORK
OSCILLATING RAIL SHIFT SCALE
BRACKET
LETTERS-FIGURES SHIFT CODE BAR
SHIFT LINK BREAKER SLIDES
CODE BAR EXTENSION
LETTERS-FIGURES SHIFT SLIDE
LEFT BREAKER SLIDE BAIL
RIGHT BREAKER SLIDE BAIL
MAIN BAIL
TM 5815-264-35-263

Figure 446. Letters-figures shift mechanism, letters positions.

(A) or to the left (B). The letters-figures code bar fork engages a pin on the bracket, which is fastened to the letters-figures shift code bar, and positions the code bar toward the right for the letters function or toward the left for the figures function (fig. 446). A slotted extension of the code bar engages a tongue from the right end of the letters-figures shift slide and causes the shift slide to follow the movements of the code bar. Pins at each end of the shift slide serve as the lower guides for the right and left shift link breaker slides. Pins which project from the front plate serve as upper guides and pivot points for the breaker slides. Mounted on the ends of the main bail are the left and right breaker slide bails.

c. When the letters function code is received, the various parts are positioned (par. 691*c* and *d*) so that the letters function lever causes the letters function slide to move to the rear. As a result, the letters-figures shift code bar moves the letters-figures shift slide to the right as shown in figure 446. This places the left shift link breaker slide in a vertical position with its lower end over the left breaker slide bail. The right breaker slide is so positioned that its lower end is to the right of the right breaker slide bail, clears the right breaker slide while the left breaker slide bail engages the left breaker slide and moves it upward. This action causes the left oscillating rail shift link assembly to break and shift the oscillating rail and type box carriage (fig. 431①) to the right. As a result, the left section of the type box is in position for the printing of letters characters. In a similar manner, when the figures function code is received, the right oscillating rail shift link assembly are broken and the oscillating rail is shifted to the left for printing in the right section (figures characters) of the type box.

d. The following sequence chart summarizes the actions that take place when the letters or figures shift function is selected.

Letters and Figures Shift Sequence Chart

Note. Before the sequence begins, it must be understood that the particular function has been selected and set up on the function box (par. 691*e*). The (a) steps below represent the letters shift, and the (b) steps represent the figures shift.

1	(a) Letters function lever moves the letters function slide to the rear.	1	(b) Figures function lever moves the figures function slide to the rear.
2	(a) Letters function slide moves letters-figures code bar fork and letters-figures shift code bar to the right.	2	(b) Figures function slide moves letters-figures code bar fork and letters-figures shift code bar to the left.

Letters and Figures Shift Sequence Chart—Continued

(a) Code bar moves the letters-figures shift slide to the right.	3	(b) Code bar moves the letters-figures shift slide to the left.
(a) Main bail moves upward	4	(b) Main bail moves upward
(a) Left shift link breaker slide moves on top of the left breaker slide bail. Right shift link breaker slide moves to the right of the right breaker slide bail.	5	(b) Left shift link breaker slide bail moves to the left breaker slide bail. Right shift link breaker slide moves on top of the right breaker slide bail.
(a) Left oscillating rail shift link assembly breaks	6	(b) Right oscillating rail shift link assembly breaks
(a) Oscillating rail moves the type box to the right for printing of letters characters.	7	(b) Oscillating rail moves the type box to the left for printing of figures characters.

3. Spacing Function

For spacing between words or any spacing ner than that which accompanies printing, operator uses the space bar on the keyboard transmit the space function code. On recep- n of the space function code, the spacing mechanism operates in the manner described in paragraph 688*b*. However, as in all functions, printing does not occur.

694. Carriage Return Function

a. The carriage return function incorporates

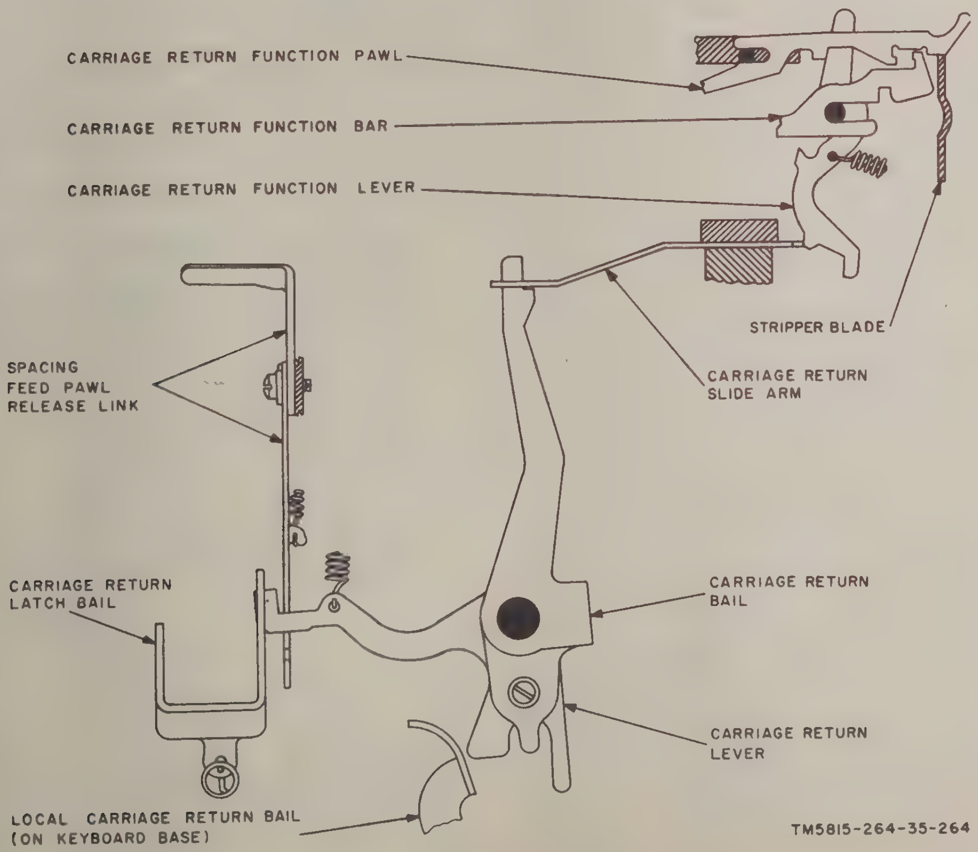

CARRIAGE RETURN FUNCTION PAWL
CARRIAGE RETURN FUNCTION BAR
CARRIAGE RETURN FUNCTION LEVER
STRIPPER BLADE
CARRIAGE RETURN SLIDE ARM
SPACING FEED PAWL RELEASE LINK
CARRIAGE RETURN LATCH BAIL
CARRIAGE RETURN BAIL
CARRIAGE RETURN LEVER
LOCAL CARRIAGE RETURN BAIL (ON KEYBOARD BASE)
TM5815-264-35-264

Figure 447. Carriage return function mechanism.

a means of returning the type box and printing carriages to the left margin through the reception of a carriage return code signal. Carriage return is accomplished as a result of any of the following operations:

(1) Reception of a carriage return code group (*b* and *c* below).
(2) Depression of the LOC CR keylever on the keyboard (*d* below).
(3) Operation of the automatic carriage return and line feed mechanism (par. 695).

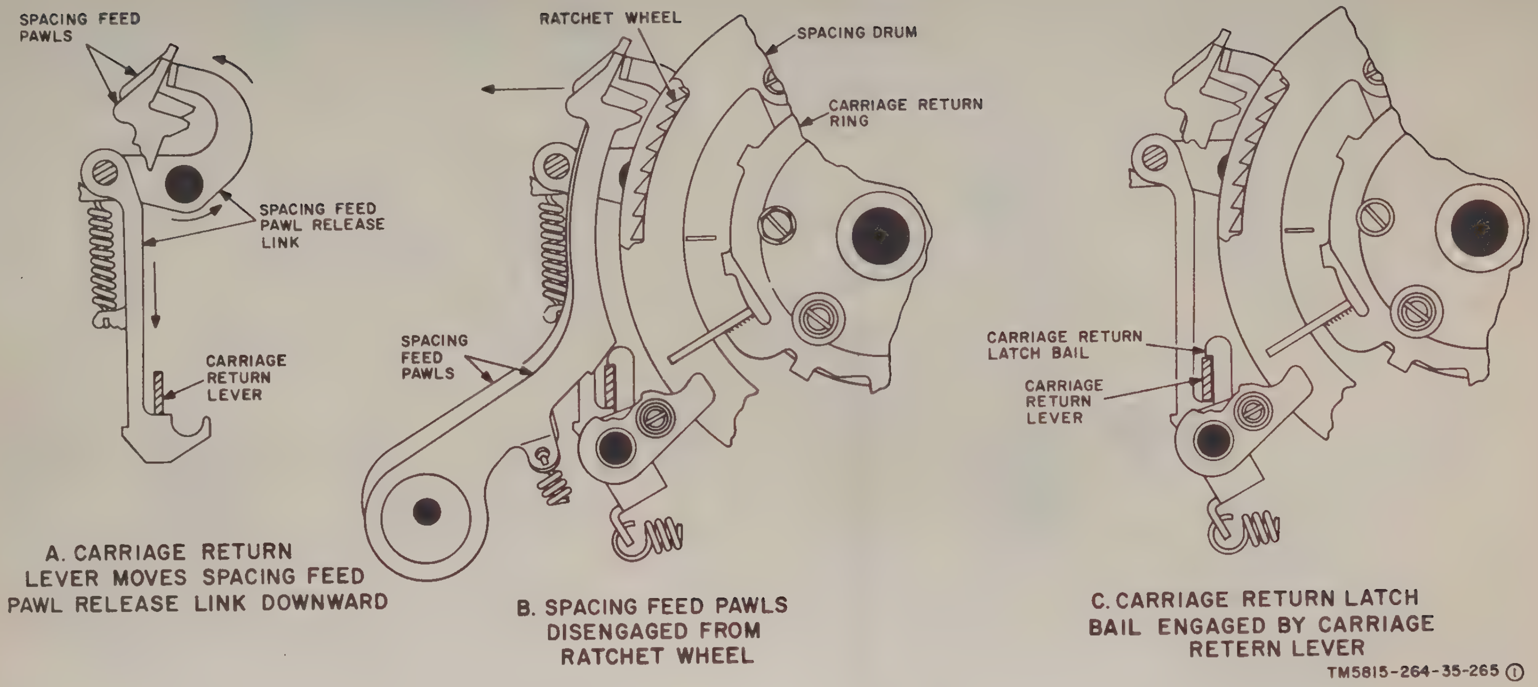
b. The carriage return function mechanism is located in the right end of the typing unit. Reception of the carriage return code causes the carriage return function bar, pawl, and lever to operate (fig. 447). The lower end of the function lever engages the carriage return slide arm and pushes it forward (to the left in fig. 447). The slide arm, in turn, moves the carriage return bail and its lever about their pivot point. As the front portion of the lever moves downward, it takes with it the lower section of the spacing feed pawl release link (A, fig. 431①). This causes the upper portion of the link to turn and disengage the spacing feed pawls from the ratchet wheel (B, fig. 431①) on the spacing drum. When the carriage return lever reaches its lowest point the carriage return latch bail (C, fig. 431①) locks it there to prevent the spacing feed pawls from engaging before the left margin is reached. The disengagement of the spacing feed pawls from the ratchet wheel permits the spring drum to return the printing and type box carriages to the left margin of the typing unit. As the spacing drum nears the end of its counterclockwise rotation, the stop arm roller (fig. 431②) contacts the transfer slide which, in turn, drives the dashpot piston into the dashpot cylinder. A small passageway with an inlet from the inside of the cylinder and three outlets to the outside is incorporated in the end of the cylinder. Two of the openings to the outside are closed by a steel ball which is held in its seat by means of a compression spring. A setscrew, which may be locked in place with a nut, is used to regulate the spring pressure on the ball. The rate of deceleration provided by the cushioning effect of the trapped air is automatically regulated for various lengths of typed lines by means of the ball valve. This, together with the direct opening to the outside, determines the rate at which the air may escape from the cylinder. When the spacing drum reaches its extreme counterclockwise position, an extension on the carriage return ring trips the carriage return latch bail plate which is fastened to the carriage return latch bail. The latch bail disengages the carriage return lever and the feed pawls are again permitted to engage the spacing drum.

c. The following chart lists the sequence of operations that occur when the carriage return signal is received and the carriage return function mechanism is activated.

Carriage Return Sequence Chart

1	Carriage return function bar operates the carriage return function pawl and lever (par. 691*e*).	
2	Function lever pushes the carriage return slide toward the front.	
3	Carriage return bail and lever rotate about their pivot point.	
4	Front portion of the carriage return lever moves the spacing feed pawl release link downward.	Carriage return latch bail locks the carriage return lever at its lowest point of travel.
5	Spacing feed pawl release link rotates about its pivot.	
6	Spacing feed pawls disengage from the ratchet wheel.	
7	Spring drum starts rotating counterclockwise, moving the type box and printing carriages toward the left margin.	Spacing drum rotates counterclockwise, following the motion applied by the spring drum.
8	Spacing drum stop arm roller contacts the transfer slide.	
9	Dashpot piston moves into the the dashpot to dampen movement.	
10	Type box and printing carriages arrive at the left margin.	Extension on carriage return ring contacts the carriage return latch bail plate to release the latch and disengage the carriage return lever.

d. Local carriage return operation is effected by depressing the LOC CR keylever on the keyboard base. The mechanism (par. 654) engages a projection on the carriage return lever and causes the operations described in *b* above to take place.


SPACING FEED PAWLS
SPACING FEED PAWL RELEASE LINK
CARRIAGE RETURN LEVER
RATCHET WHEEL
SPACING DRUM
CARRIAGE RETURN RING
SPACING FEED PAWLS
CARRIAGE RETURN LATCH BAIL
CARRIAGE RETURN LEVER
TM5815-264-35-265 ①

A. CARRIAGE RETURN LEVER MOVES SPACING FEED PAWL RELEASE LINK DOWNWARD

B. SPACING FEED PAWLS DISENGAGED FROM RATCHET WHEEL

C. CARRIAGE RETURN LATCH BAIL ENGAGED BY CARRIAGE RETERN LEVER

Figure 448①. Carriage return mechanism (part 1 of 2).

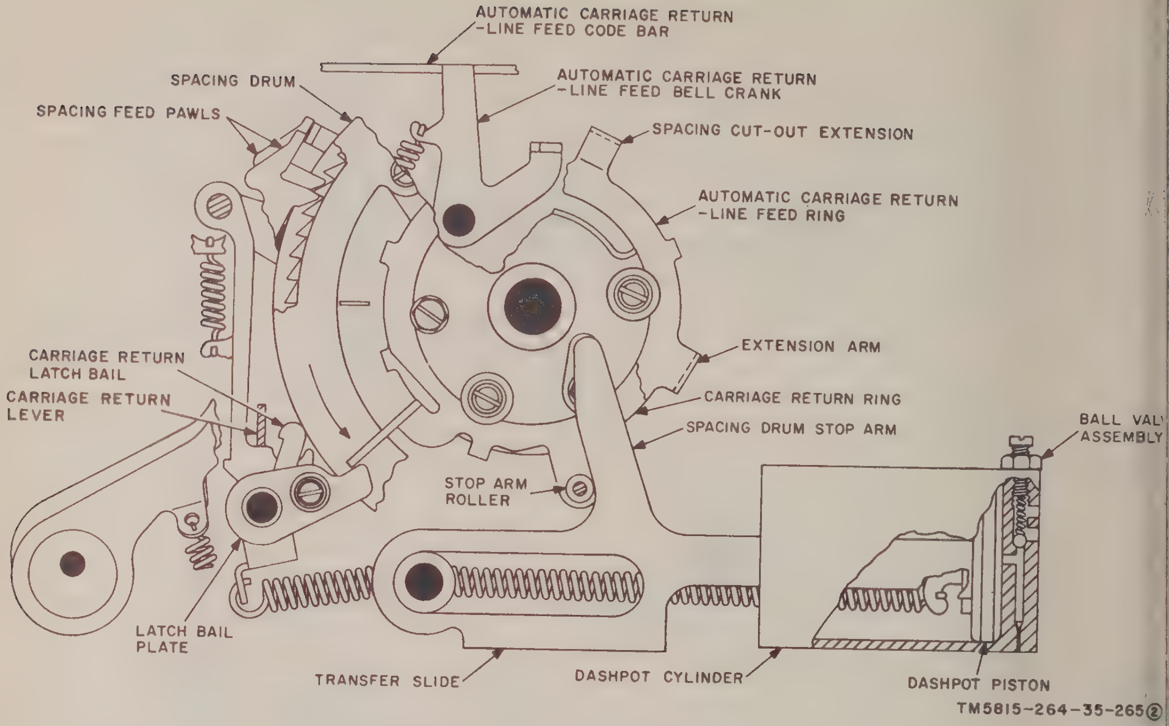

AUTOMATIC CARRIAGE RETURN
-LINE FEED CODE BAR
SPACING DRUM
AUTOMATIC CARRIAGE RETURN
-LINE FEED BELL CRANK
SPACING FEED PAWLS
SPACING CUT-OUT EXTENSION
AUTOMATIC CARRIAGE RETURN
-LINE FEED RING
EXTENSION ARM
CARRIAGE RETURN
LATCH BAIL
CARRIAGE RETURN
LEVER
CARRIAGE RETURN RING
SPACING DRUM STOP ARM
BALL VAL
ASSEMBLY
STOP ARM
ROLLER
LATCH BAIL
PLATE
TRANSFER SLIDE
DASHPOT CYLINDER
DASHPOT PISTON
TM5815-264-35-265②

Figure 448②. Carriage return mechanism (part 2 of 2).

695. Line Feed Function

a. The line feed function provides a means of feeding out the paper of the local typing unit (one or two lines at a time) on reception of a line feed signal. Line feed is accomplished as a result of following operations:

(1) Reception of a line feed code group (*b* through *e* below).

(2) Depression and rotating of the platen handwheel (*f* below).

(3) Depression of the LOC LF keylever on the keyboard base (*g* below).

(4) Operation of the automatic carriage and line feed mechanism (par. 696).

b. The line feed function mechanism is located in the left side of the typing unit. The reception of the line feed code causes the line feed function bar, pawl, and lever to operate (A, fig. 449). The lower end of the line feed function lever engages the line feed slide arm and pushes it forward (to the left in A, fig. 449). The slide arm, in turn, moves the line feed clutch trip arm and the trip lever about their pivot point until the trip lever releases the three-stop line feed clutch. The line feed gearing is such that each one-third revolution of the clutch will advance the platen by one line. Therefore, the length of time that the line feed clutch trip lever is held away from the clutch will determine the number of line feeds that occur. The timing relationship between the stripper blade cycle (fig. 444) and the main shaft rotation is such that the function pawl is not stripped by the stripper blade until after more than one-third of a revolution of the line feed clutch (B, fig. 449) has occurred. Thus, the line feed clutch trip lever will stop the clutch after two thirds of a revolution, (double line feed) has occurred. When single line feed is desired, it is necessary to strip the function pawl from the line feed function bar before the line feed clutch completes one third of a revolution. This is accomplished by the use of a line

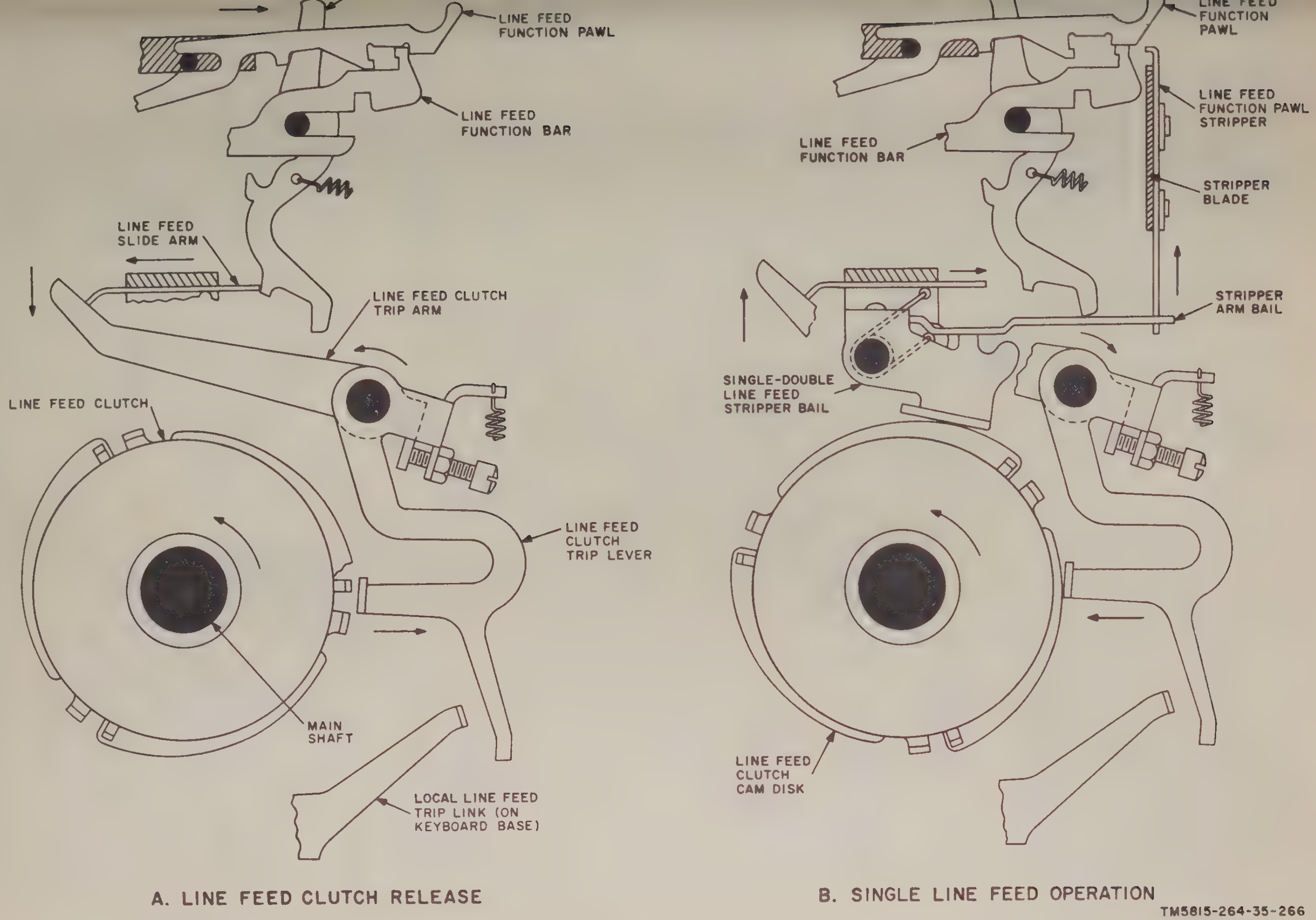

LINE FEED FUNCTION PAWL
LINE FEED FUNCTION BAR
LINE FEED SLIDE ARM
LINE FEED CLUTCH TRIP ARM
LINE FEED CLUTCH
LINE FEED CLUTCH TRIP LEVER
MAIN SHAFT
LOCAL LINE FEED TRIP LINK (ON KEYBOARD BASE)
A. LINE FEED CLUTCH RELEASE
LINE FEED FUNCTION PAWL
LINE FEED FUNCTION PAWL STRIPPER
LINE FEED FUNCTION BAR
STRIPPER BLADE
STRIPPER ARM BAIL
SINGLE-DOUBLE LINE FEED STRIPPER BAIL
LINE FEED CLUTCH CAM DISK
B. SINGLE LINE FEED OPERATION
TM5815-264-35-266

Figure 449. Line feed function and clutch trip mechanisms.

feed function pawl stripper (auxiliary to the stripper blade), which is attached to the stripper bail. The line feed function pawl stripper is actuated by the stripper bail arm through the single-double line feed stripper bail. The stripper bail arm (A, fig. 450) is shifted to the left or right by the single-double line feed operating arm (C, fig. 450). When the single-double line feed lever is toward the front of the typing unit (single line feed), the stripper bail arm is permitted to engage the slot in the line feed function pawl stripper (B, fig. 450) When the lever is toward the rear of the typing unit, the stripper bail arm is shifted ou of the slot in the line feed function paw stripper. The line feed clutch cam disk on th three-stop line feed clutch (B, fig. 449) operate the single-double line feed stripper bail onc each one-third revolution of the line feed clutch If the stripper bail arm is inserted in the lin feed stripper slot (B, fig. 450) it will strip th selected line feed function pawl (B, fig. 449

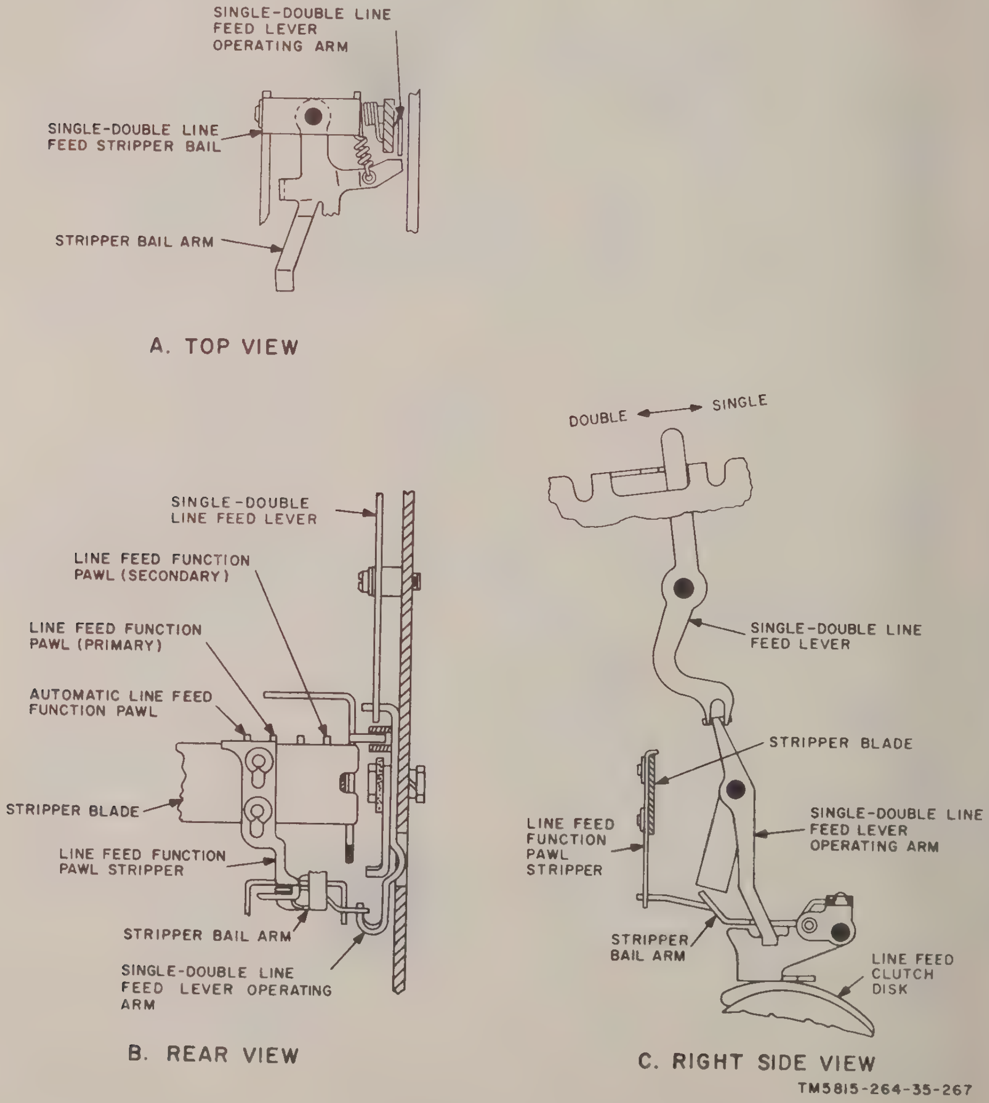

SINGLE-DOUBLE LINE FEED LEVER OPERATING ARM
SINGLE-DOUBLE LINE FEED STRIPPER BAIL
STRIPPER BAIL ARM
A. TOP VIEW
SINGLE-DOUBLE LINE FEED LEVER
LINE FEED FUNCTION PAWL (SECONDARY)
LINE FEED FUNCTION PAWL (PRIMARY)
AUTOMATIC LINE FEED FUNCTION PAWL
STRIPPER BLADE
LINE FEED FUNCTION PAWL STRIPPER
STRIPPER BAIL ARM
SINGLE-DOUBLE LINE FEED LEVER OPERATING ARM
B. REAR VIEW
DOUBLE
SINGLE
SINGLE-DOUBLE LINE FEED LEVER
STRIPPER BLADE
LINE FEED FUNCTION PAWL STRIPPER
SINGLE-DOUBLE LINE FEED LEVER OPERATING ARM
STRIPPER BAIL ARM
LINE FEED CLUTCH DISK
C. RIGHT SIDE VIEW
TM5815-264-35-267

Figure 450. Positioning mechanism for single or double line feed.

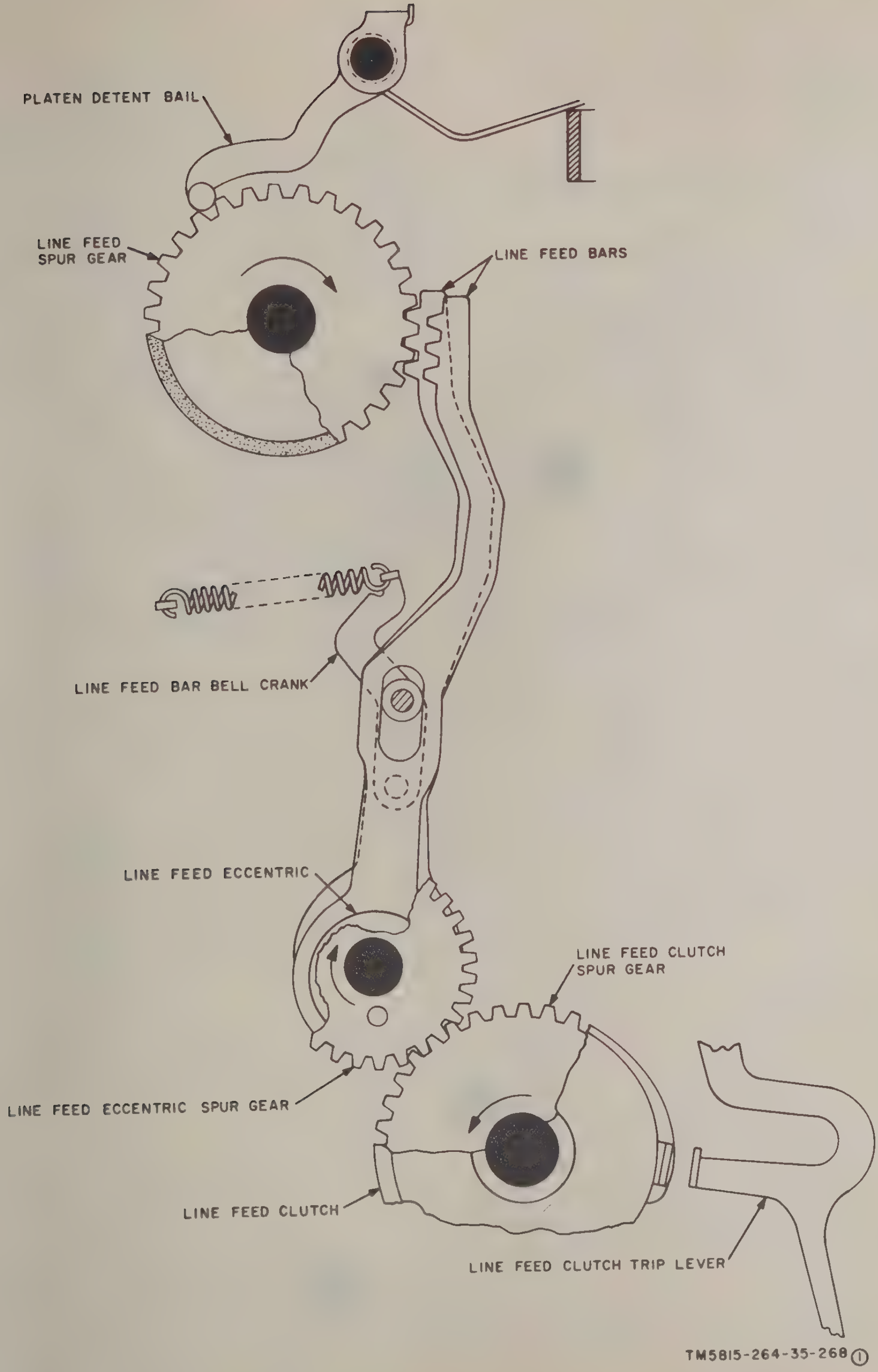

PLATEN DETENT BAIL
LINE FEED SPUR GEAR
LINE FEED BARS
LINE FEED BAR BELL CRANK
LINE FEED ECCENTRIC
LINE FEED CLUTCH SPUR GEAR
LINE FEED ECCENTRIC SPUR GEAR
LINE FEED CLUTCH
LINE FEED CLUTCH TRIP LEVER
TM5815-264-35-268①

Figure 451①. Line feed mechanism (part 1 of 2).

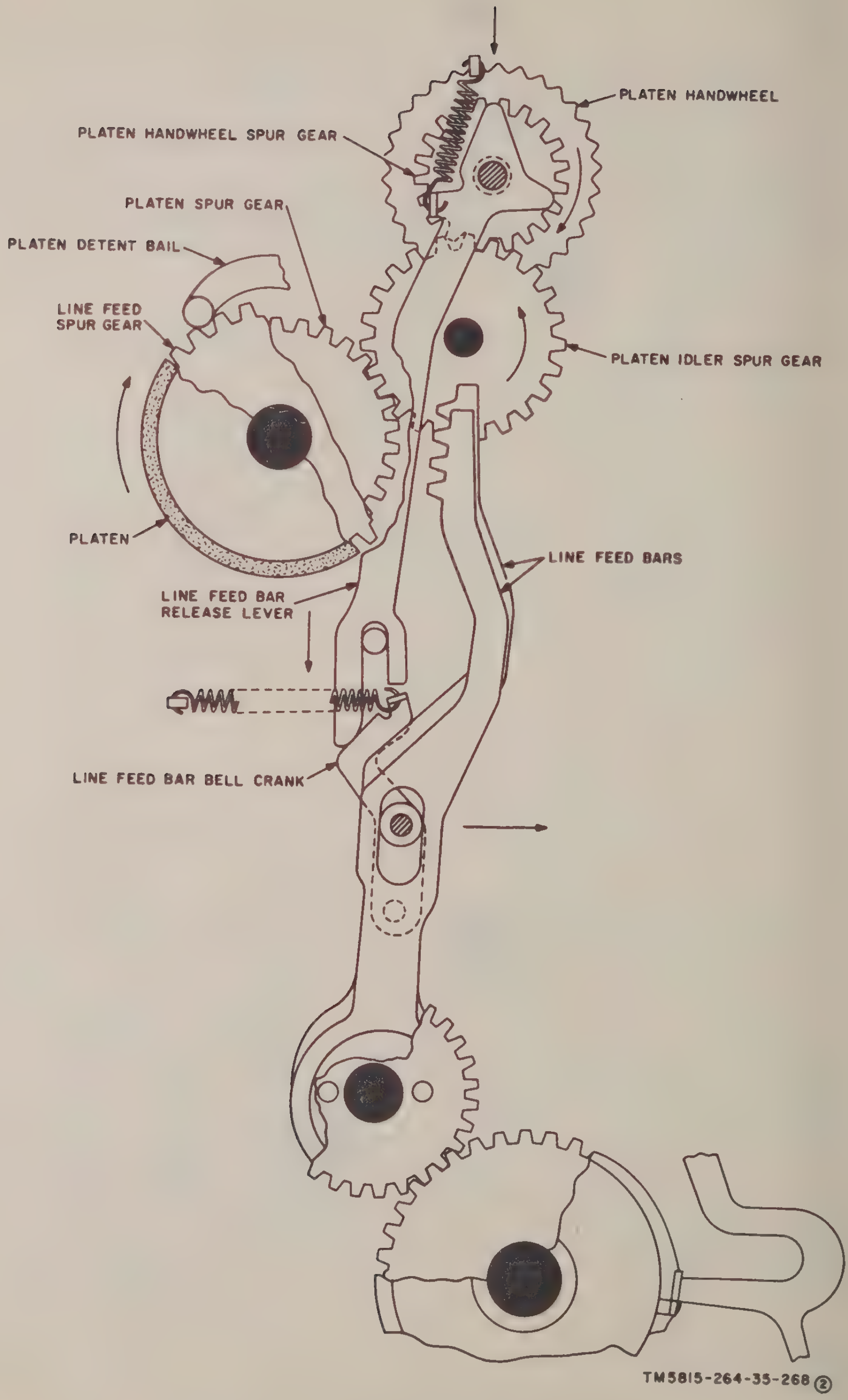

PLATEN HANDWHEEL
PLATEN HANDWHEEL SPUR GEAR
PLATEN SPUR GEAR
PLATEN DETENT BAIL
LINE FEED SPUR GEAR
PLATEN IDLER SPUR GEAR
PLATEN
LINE FEED BARS
LINE FEED BAR RELEASE LEVER
LINE FEED BAR BELL CRANK
TM5815-264-35-268 ②

Figure 451②. Line feed mechanism (part 2 of 2).

from its respective function bar immediately after the stop lug on the line feed clutch is released. The clutch will then revolve only one third of a revolution and will then be disengaged by the clutch trip lever.

c. When single line feed is being used, the line feed function lever is released too soon (by the line feed function pawl stripper) to suppress spacing. Therefore, an additional line feed function bar, pawl, and lever are installed in the extreme left end of the function box for the sole purpose of suppressing spacing on single line feed function. This mechanism, which always operates on reception of the line feed code, is released only by the stripper blade, and therefore holds the spacing suppression bail operated until the spacing cycle is completed. After the line feed clutch is stopped by its trip lever, it is disengaged by the trip lever and latch lever.

d. Each one-third revolution of the line feed clutch causes the attached spur gear (fig. 451①) to rotate the line feed eccentric spur gear and the attached eccentrics one half of a revolution. The eccentrics, which are offset in opposite directions, each carry a line feed bar. These bars, guided by the line feed bar bell crank, alternately engage the line feed spur gear on the platen and advance the platen one line for each one-half turn of the line feed eccentrics. A platen detent bail engages the line feed spur gear to retain the platen at each setting.

e. The following sequence chart summarizes the operations that occur when a line feed signal is received and the line feed function is activated.

Line Feed Sequence Chart

1	Two line feed function bars operate the associated line feed function pawls and levers (par. 691*e*).	
2	Primary line feed function lever moves the line feed slide arm forward.	Secondary line feed function lever moves the spacing suppression slide forward.
3	Line feed slide arm rotates the line feed clutch trip arm and trip lever about the pivot point.	
4	Line feed clutch engages and rotates.	Single-double line feed stripper bail strips the primary line feed function pawl from the function bar (if single-double line feed lever is set for single line feed).
5	Line feed clutch spur gear rotates the eccentric gear.	
6	Eccentric gear rotates the line feed eccentrics	
7	Line feed bars move platen spur gear	
8	Platen rotates and feeds out paper	
9	Line feed clutch trip lever engages a stop lug on the clutch after one-or-two-thirds revolution (depending on the single-double line feed lever setting).	Stripper blade strips secondary line feed function pawl from its function bar, and also strips the primary line feed function pawl if the single-double line feed lever is set for double line feed.
10	Line feed clutch disengages	

f. Manual positioning of the platen (for paper loading, adjustment, etc.) is accomplished by bearing down on and turning the platen handwheel (fig. 451②). This causes the platen handwheel spur gear to engage the platen idler spur gear which, in turn, is engaged with the platen spur gear on the platen shaft. At the same time, the line feed bar release lever bears against the line feed bar bell crank and causes it to disengage the line feed bars from the line feed spur gear.

g. Operation of the line feed mechanism from the local keyboard is accomplished by pressing the LOC LF keylever. The local line feed mechanism (par. 648), when operated, engages the lower projection on the line feed clutch trip lever to cause the line feed clutch to engage. This, then, will cause the operations described in *d* above to occur. As a result, paper will feed out of the local typing unit for as long as the key is held down, without disturbing the signal line.

696. Automatic Carriage Return-Line Feed Function

a. The automatic carriage return-line feed function is provided to prevent piling at the end of a printed line on the local typing unit should an operator fail to send the carriage return and line feed signals as part of the printed message.

b. When the type box and printing carriages are within one character space from the right limit of a printed line, an extension arm on the automatic carriage return-line feed ring on the spacing drum trips the automatic carriage return-line feed bell crank (fig. 448②). As the bell crank turns clockwise, it shifts the automatic carriage return-line feed code bar to the right. Located adjacent to the carriage return and to the line feed function bars in the function box are the automatic carriage return-line feed function bars. These two function bars are identical in that they have only one projection located opposite the automatic carriage return-line feed code bar. The code bar, under normal conditions, blocks the automatic carriage return and line feed function bars. When the code bar is shifted to the right these function bars and their associated function pawls and levers operate the carriage return slide arm and the line feed slide arm respectively, thereby causing the carriage return and line feed functions to occur simultaneously. Thus the operations given for the carriage return function (par. 694*b*) and the line feed function (par. 695*b* through *d*) are identical, except in the method of initiation. The illustrations referenced in paragraphs 694 and 696 indicate the difference in parts.

c. The following chart lists the sequence of operations for the automatic carriage return-line feed function.

Automatic Carriage Return-Line Feed Sequence Chart

1	An extension arm on the automatic carriage return-line feed ring on the spacing drum trips the automatic carriage return bell crank.	
2	Automatic carriage return-line bell crank rotates clockwise.	
3	Automatic carriage return-line feed code bar shifts to the right.	
4	Automatic carriage return function bar moves forward and operates the associated function pawl and lever (par. 691*e*).	Automatic line feed function bar moves forward and operates its associated function pawl and lever (par. 691*e*).

Automatic Carriage Return-Line Feed Sequence Chart
—Continued

5	Carriage return sequence (beginning with step 2) of paragraph 694*c* occurs.	Line feed sequence (beginning with step 2) of paragraph 695*e* occurs.
6	Carriage is returned and paper is fed out simultaneously.	

697. Signal Bell Function

a. The signal bell function mechanism provides a method of operating, on reception of an appropriate code, the signal bell is contained in the cabinet.

b. The circuit to the signal bell DS5 is controlled by a set of normally-open electrical contacts of the signal bell function switch S12 mounted on the function box. This switch is held open by the signal bell function lever (A, fig. 452) in its unoperated condition. The signal bell function bar has six code lugs: five for the letter S signal code, and one for letters-figures shift code bar (figures position). To operate the signal bell, the letters-figures shift code bar must first be shifted to the figures position (par. 692). Then, each time the signal code for the letter S is received, the function lever will operate (as described in par. 691) and the signal bell contact will move to the closed position (B, fig. 452). The clapper will strike the bell once each time the code is received. If the signal code for the letter S is received when the letters-figures shift code bar is in the letters (lower case) position, the signal bell function bar will be blocked by the shift code bar.

c. The following sequence chart summarizes the actions that take place when the signal bell function is selected.

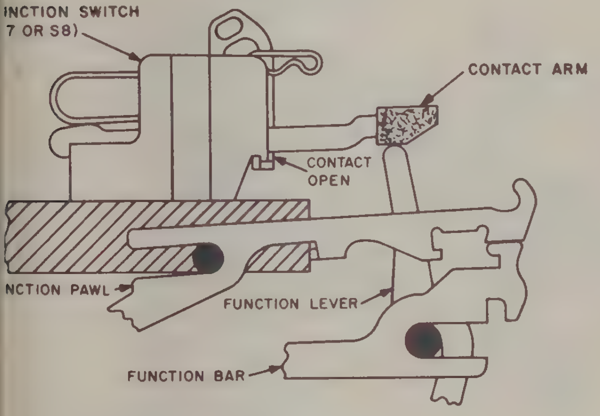
Signal Bell Sequence Chart

1	Signal bell function bar operates the signal bell function pawl and lever (par. 691).
2	Function lever moves toward the rear
3	Signal bell function switch S12 closes
4	Signal bell rings

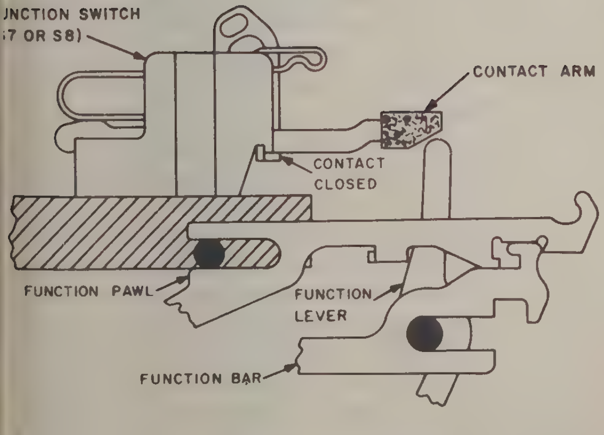
698. Motor Stop Function

a. The motor stop function mechanism provides a method of operating the stop portion of the motor control assembly on reception of an appropriate code signal.

b. The stop magnet E1 of the motor control assembly is controlled by a set of normally-open electrical contacts of the motor stop function switch S13 located above the motor stop function bar. The switch contacts are held open by the motor stop function lever (A, fig. 452) in its unoperated condition. The motor stop function bar has six code lugs: five for the letter H signal code, and one for the letters-figures shift code bar (figures position). To operate the motor stop function, the letters-figures shift code bar must first be shifted to the figures position (par. 692). Then when the signal code for the letter H is received, the function lever will operate (as described in paragraph 691) and the motor stop switch contacts will move to the close position (B, fig. 452). Thus the circuit will momentarily close. If the signal code for the letter H is received when the letters-figures shift code bar is in the letters position, the motor stop function bar will be blocked by the shift code bar. (Refer to par. 711*c* for theory of operation of the motor control assembly.)



A. UNSELECTED POSITION



B. SELECTED POSITION

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Figure 452. Function box switch mechanism.

c. The following chart lists the sequence of operations for the motor stop function.

Motor Stop Sequence Chart

1	Motor stop function bar operates the motor stop function pawl and lever (par. 691*e*).
2	Function lever moves toward the rear
3	Motor stop contacts of switch S13 close
4	Motor stop magnet E1 energizes

699. Selective Calling Function

a. *General*. The selective calling function included in the typing unit provides a method of directing transmissions to one or more stations on the circuit by the use of a pre-set code. As with basic functions (motor stop, signal bell, etc.), the method and means of activating the selective calling function is essentially the same. A series of function bars (rather than only one) must be selected in proper sequence before a message transmission can be started. In effect, the action that occurs is a suppression of printing on the typing unit, unless the proper code sequence has been received. The code series used is made up of two components: a conditioning code, which is identical for all stations, and a call directing (or station) code sequence, which will vary for each station or group of stations. The conditioning code sequence consists of four codes: two figures codes followed by two letters codes (FIGS-FIGS-LTRS-LTRS), which will always precede the call directing code sequence and never varies.

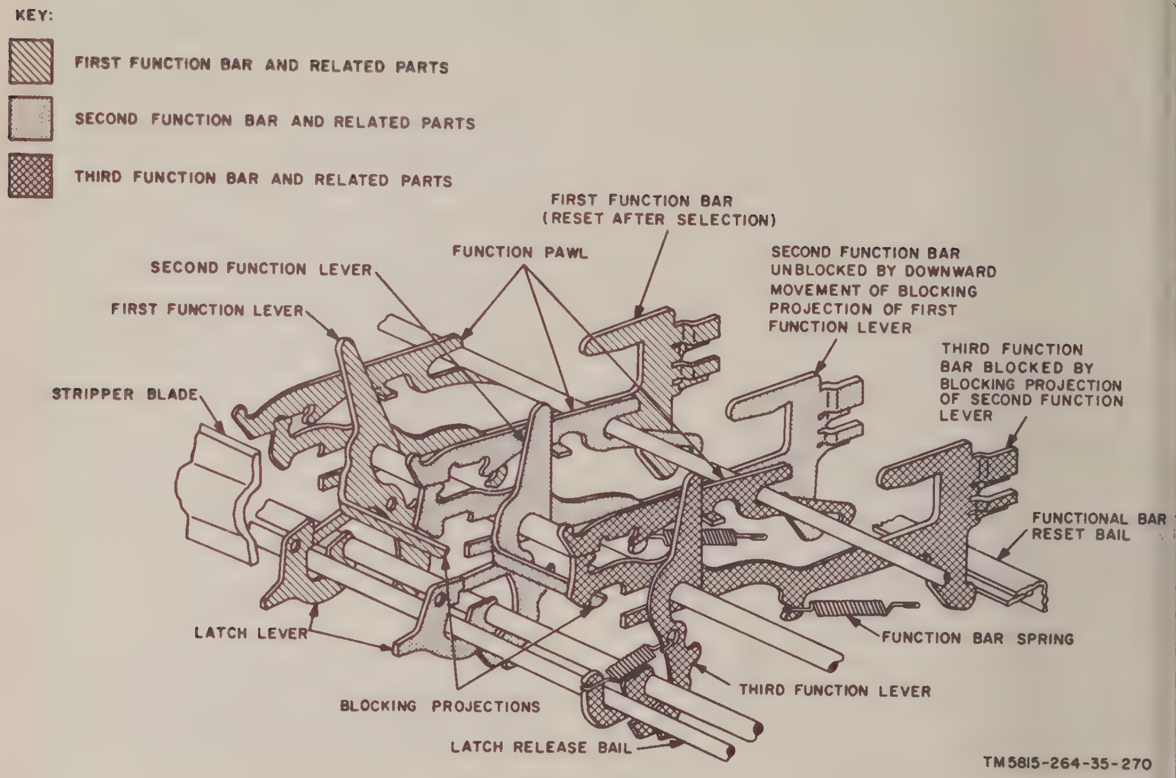

KEY:
FIRST FUNCTION BAR AND RELATED PARTS
SECOND FUNCTION BAR AND RELATED PARTS
THIRD FUNCTION BAR AND RELATED PARTS
FIRST FUNCTION BAR (RESET AFTER SELECTION)
FUNCTION PAWL
SECOND FUNCTION LEVER
FIRST FUNCTION LEVER
SECOND FUNCTION BAR UNBLOCKED BY DOWNWARD MOVEMENT OF BLOCKING PROJECTION OF FIRST FUNCTION LEVER
THIRD FUNCTION BAR BLOCKED BY BLOCKING PROJECTION OF SECOND FUNCTION LEVER
STRIPPER BLADE
FUNCTIONAL BAR RESET BAIL
LATCH LEVER
FUNCTION BAR SPRING
THIRD FUNCTION LEVER
BLOCKING PROJECTIONS
LATCH RELEASE BAIL
TM5815-264-35-270

Figure 453. Selective calling mechanism.

The call directing code sequence varies from station to station and can consist of either three or four codes (as may be required). In brief, the conditioning code enables the typing unit to accept the call directing code sequence, and also insures that a station cannot be called during the course of a normal transmission. As the last code of the call directing code is received (whether it is set for three or four codes), the function lever associated with the function bar used for that code closes a set of switch contacts. This, in turn, operates the print suppression solenoid L1 to remove a blocking arrangement from the type box clutch, and in so doing, conditions the equipment for printing of a message.

b. Selecting.

(1) A series of eight function bars, pawls and levers are located approximately in the center of the function box. From left to right (when facing the rear of the typing unit), the first and second function bars are set to be activated on the figures code (FIGS-FIGS) and the third and fourth function bars are set to be activated on the letters code (LTRS-LTRS). The remaining four function bars are of the universal type and must be set for the particular code on which they are to operate. Located just above each of the seventh and eighth function bars are a pair of normally-open electrical contacts (part of selective calling function switch S13). They are positioned in such a way that the associated function levers cause them to close when the levers are operated. The left end of the typing unit (fig. 454) contains the printing suppression mechanism which performs as part of the selective calling function.

When the station has not been selected or called, it prevents engagement of the type box clutch so that the typing unit is unable to print, and when the station is called, it removes the blocking action to permit printing.

(2) As each code of the selective calling code is received, it causes a function bar to be operated, thus operating its associated function pawl and lever (in the manner described in par. 691). Figure 453 shows a section of the selective calling mechanism. At the instant shown, the first code of the selective calling sequence has been received; the function pawl of the selected function bar has caused the first function lever to pivot counterclockwise. This then removes the projection blocking forward movement of the adjacent (second code) function bar. The latch lever locks the first function lever in position, thus preventing it from returning to the unoperated position as the stripper blade rises and strips the function pawl from the function bar. While the function lever is held in its operated position, the second function bar can be selected by the second code of the selective calling sequence, initiating a similar chain of events. While the second function bar is being selected, the stripper blade descends and strikes the latch lever arm and releases the first function lever. While the second function lever is latched in the operated position, the third consecutive code of the sequence will position the code bars to allow the operation of the third function bar, pawl, and lever. The sequence of a preceding function bar (code) unlatching parts to allow operation of a following function bar continues until the last code of the entire code is received. As the last function lever operates, it moves away from the function contact arm switch (B, fig. 452), causing the contacts to close and complete the circuit to the printing suppression solenoid L1. As this happens, the solenoid core moves to the left and pivots the blocking bail (through the blocking bail lever) in a counterclockwise direction (fig. 454). As this happens, the blocking bail extension moves away from the travel path of the suppression arm attached to the type box clutch trip arm. This, in turn, permits the type box clutch to operate, and the message can be received. The associated latch lever holds the function lever of the last code in this position until the end of message code (blank function) strips it from the operated condition (par. 700). This will then de-energize the print suppression solenoid L1 and the mechanism will return to its at-rest position and block printing until the appropriate code is received once again.

c. Sequence Chart. The following sequence chart summarizes the operations that occur when the selective calling function is activated.

Selective Calling Sequence Chart

1 Each code (seven or eight) of the selective calling code operates the associated function bar, pawl, and lever, and unlatches the next succeeding function bar.

Note. The sequence given in paragraph 691e is repeated (1 above) for each code of the code sequence.

2 Last function lever (seventh or eighth) moves away from the associated function switch contact arm.

3 Switch contacts close and the print suppression solenoid L1 becomes energized.

4 Solenoid core moves against the blocking bail lever.

5 Blocking bail rotates about its pivot

6 Blocking bail extension moves away from the suppression arm of the type box clutch trip arm.

7 Printing on the typing unit is enabled until the blank function (end of message code) is received (par. 700).

d. Bypassing. When selective calling is not to be used, it is bypassed or locked out by holding the print suppression mechanism in the unlocked position. This is done by positioning the suppression code bar to the right (viewed from the front of the unit) and inserting the

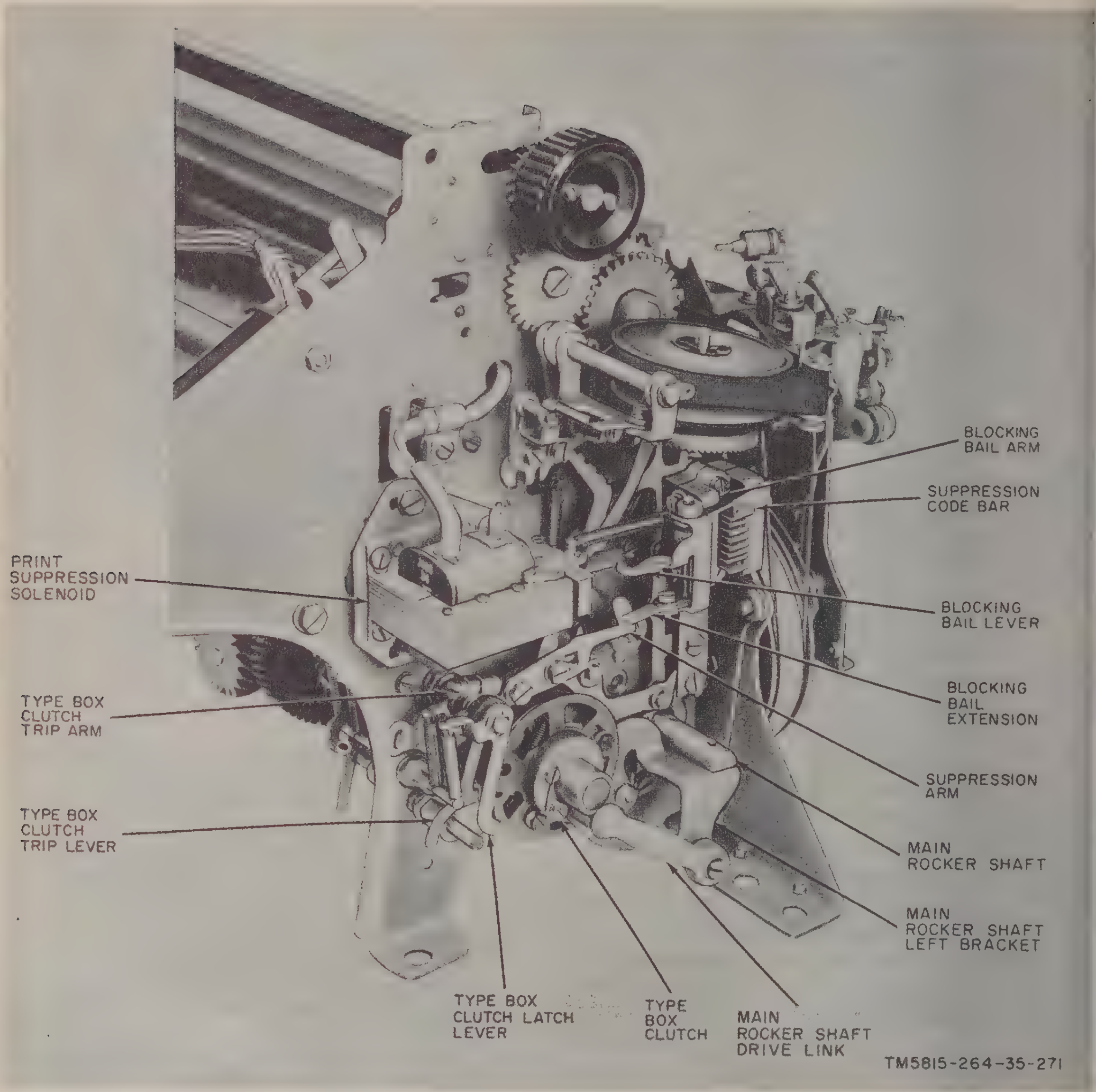

BLOCKING BAIL ARM
SUPPRESSION CODE BAR
PRINT SUPPRESSION SOLENOID
BLOCKING BAIL LEVER
BLOCKING BAIL EXTENSION
TYPE BOX CLUTCH TRIP ARM
SUPPRESSION ARM
MAIN ROCKER SHAFT
TYPE BOX CLUTCH TRIP LEVER
MAIN ROCKER SHAFT LEFT BRACKET
TYPE BOX CLUTCH LATCH LEVER
TYPE BOX CLUTCH
MAIN ROCKER SHAFT DRIVE LINK
TM5815-264-35-271

Figure 454. Printing suppression mechanism.

lockout clip in the notch in its front edge (fig. 34). Since the blocking bail is coupled to the suppression code bar, this, in effect, accomplishes the same thing as the print suppression solenoid (*b* above), in that the blocking bail extension is kept from interfering with the suppression arm. Thus, all traffic will be printed on the typing unit.

700. Blank Function

a. The blank function, in effect, operates as part of the selective calling mechanism (par. 699). When placed in operation, it strips the last function lever of the selective calling group from the operated position (thus opening the circuit to the print suppression solenoid), and it also places parts in motion that operate the

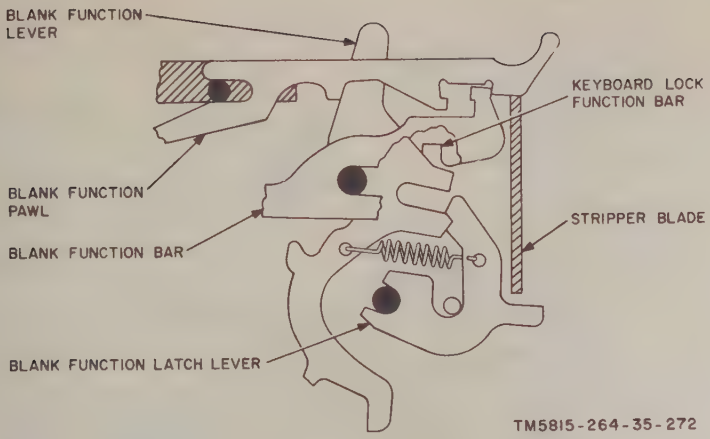


Figure 455. Blank function mechanism (number 1 or 2 position).

keyboard receive mechanism (par. 649) to lock out the keyboards.

b. The blank function mechanism is made up of two sets of three function bars, pawls, and levers, one of which is located to the left and to the right of the selective calling parts in the function box. All six of these function bars are arranged to operate on reception of a blank code signal. When three consecutive blank signal codes are received, the mechanism becomes activated and moves the latch release bail down to strip the function lever of the last selective calling code from its operated position. It also causes the keyboard lock lever to move down and operate the keyboard receive mechanism. The operation of the blank function mechanism is somewhat similar to the selective calling mechanism shown in figure 453. On reception of the first blank code signal, the number 1 blank function bar (the one to the left when facing the rear of the typing unit) of each group of three blanks moves toward the front (fig. 455), thus permitting its associated function pawl to operate the function lever (as described in par. 691). As the function levers rotate clockwise, they remove the projection blocking forward movement of each number 2 blank function bar in each group. The latch lever locks each of the two number 1 blank function levers in place, thus preventing them from returning to the unoperated position when the stripper blade rises and strips the function pawls from their function bars. With the number 1 blank function levers held in the operated position, the number 2 blank function bars can be selected by the second blank code signal, causing a similar chain of events to occur. While the number 2 function levers are latched in the operated position, the third consecutive blank signal positions each of the two sets of number 3 blank function bars, pawls, and levers. The number 3 blank function levers (fig. 456) differ from the number 1 and 2 function levers in that their lower rear edge contains an extension arranged to mount the rod-shaped latch release bail between them. As the two number 3 blank function levers rotate about their pivot points, they cause two operations to occur. The latch release bail, which fastened between the two number 3 function levers, moves downward (with the function lever motion) and contacts the lower projection of the last-code latch lever in the selective calling mechanism (fig. 453). This downward motion releases the last-code function lever and causes it to return to the unoperated position. The edge of the right-hand number 3 function lever contacts the keyboard lock slide arm (fig. 456) and moves it forward. This, in turn, causes the keyboard lock levers to rotate about their pivots so that the lower one contacts the keyboard lock plunger and

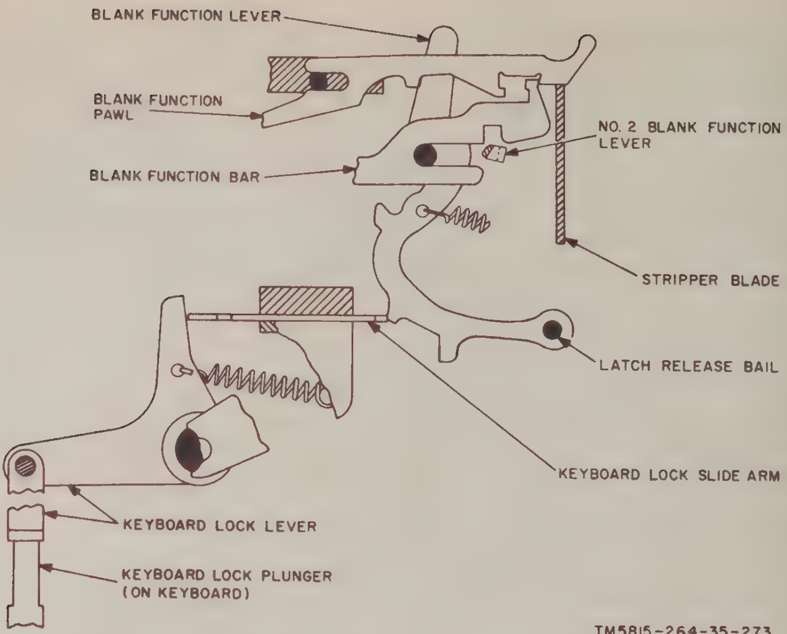

BLANK FUNCTION LEVER
BLANK FUNCTION PAWL
BLANK FUNCTION BAR
NO. 2 BLANK FUNCTION LEVER
STRIPPER BLADE
LATCH RELEASE BAIL
KEYBOARD LOCK SLIDE ARM
KEYBOARD LOCK LEVER
KEYBOARD LOCK PLUNGER (ON KEYBOARD)
TM5815-264-35-273

Figure 456. Blank function mechanism (number 3 position).

moves it downward. This then operates the keyboard receive mechanism (par. 649).

c. The following chart lists the sequence of operations for the blank function mechanism.

Blank Function Sequence Chart

Note. The method in which each of the blank function bars, pawls, and levers operates is as described in paragraph 691*e*.

1	First blank code signal operates the number 1 blank function bar, pawl, and lever (in each of the two groups), and unlatches the adjacent (number 2) function bar for operation.
2	Second blank code signal operates the number 2 blank function bar, pawl, and lever (in both groups), and unlatches the next function bar (number 3) for operation.
3	Third blank code signal operates the number 3 blank function bar, pawl, and lever (in both groups).

Blank Function Sequence Chart—Continued

4	Both number 3 blank function levers rotate about their pivot points.	
5	Latch release bail moves downward.	Rear edge of the right-hand number 3 function lever moves the keyboard lock slide arm forward.
6	Latch release bail trips the last-code latch lever from its function lever.	Keyboard lock levers rotate about their pivots and depress the keyboard lock plunger.
7	Selective calling is disabled.	Keyboard receive mechanism is put in operation (par. 649*d*).

Section III. DETAILED MECHANICAL THEORY OF TELETYPEWRITER SET AN/FGC-58

701. Block Diagram of Teletypewriter Set AN/FGC-58

a. General. Teletypewriter Set AN/FGC-58, for the most part, is the same as Teletypewriter Set AN/FGC-56, except that it is equipped with an additional receiving device (reperforator). Since the greatest part of an AN/FGC-58 is identical to the AN/FGC-56, the addition of the reperforator does not alter the operation of the identical components, re-

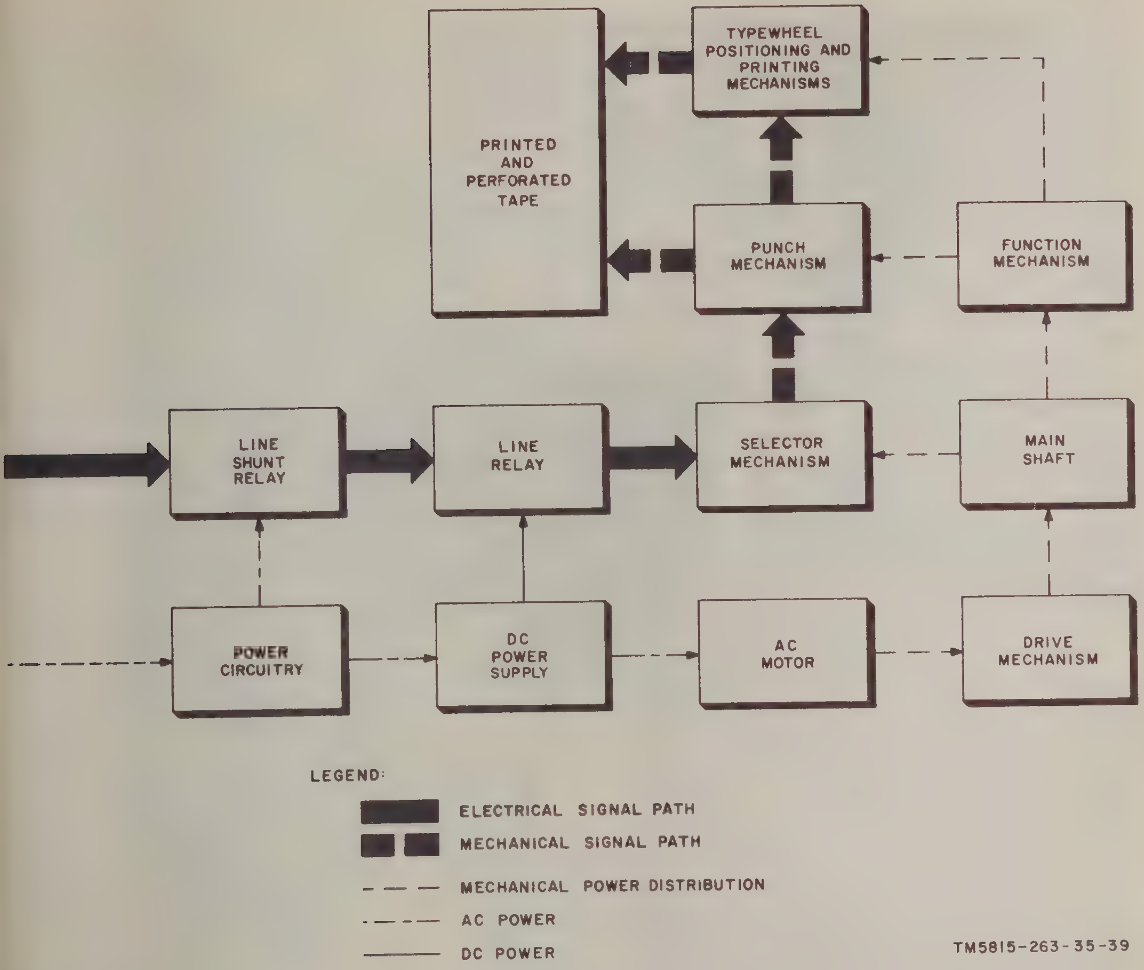

TYPEWHEEL POSITIONING AND PRINTING MECHANISMS
PRINTED AND PERFORATED TAPE
PUNCH MECHANISM
FUNCTION MECHANISM
LINE SHUNT RELAY
LINE RELAY
SELECTOR MECHANISM
MAIN SHAFT
POWER CIRCUITRY
DC POWER SUPPLY
AC MOTOR
DRIVE MECHANISM
LEGEND:
ELECTRICAL SIGNAL PATH
MECHANICAL SIGNAL PATH
MECHANICAL POWER DISTRIBUTION
AC POWER
DC POWER
TM5815-263-35-39

Figure 457. Reperforator, functional block diagram.

fer to Section II of this Chapter for their description. Operation of the reperforator only is described in the paragraphs that follow.

b. Receiving on Tape (fig. 457). The reperforator can be connected to operate in series with the components of the set or it can be connected to operate from a separate signal line. When connected in series, it will provide tape copy of all messages sent and received on the local machine; when connected to a separate line, it provides tape copy of the messages sent only on that line. In either case, the reperforator receives the d-c, start-stop impulses through its associated line relay into the selector mechanism. The selector mechanism converts the electrical impulses to a series of mechanical movements which result in an arrangement of parts (in the punch, printing, and positioning mechanisms) that correspond to the code group received. The selector mechanism also initiates operation of the function mechanism which transmits motion (delivered from the drive mechanism by the main shaft) to the punch, printing, and positioning mechanisms. The positioning of parts simultaneously with the application of motion thus causes the character impulses received by the selector to be produced on tape as five-unit per-

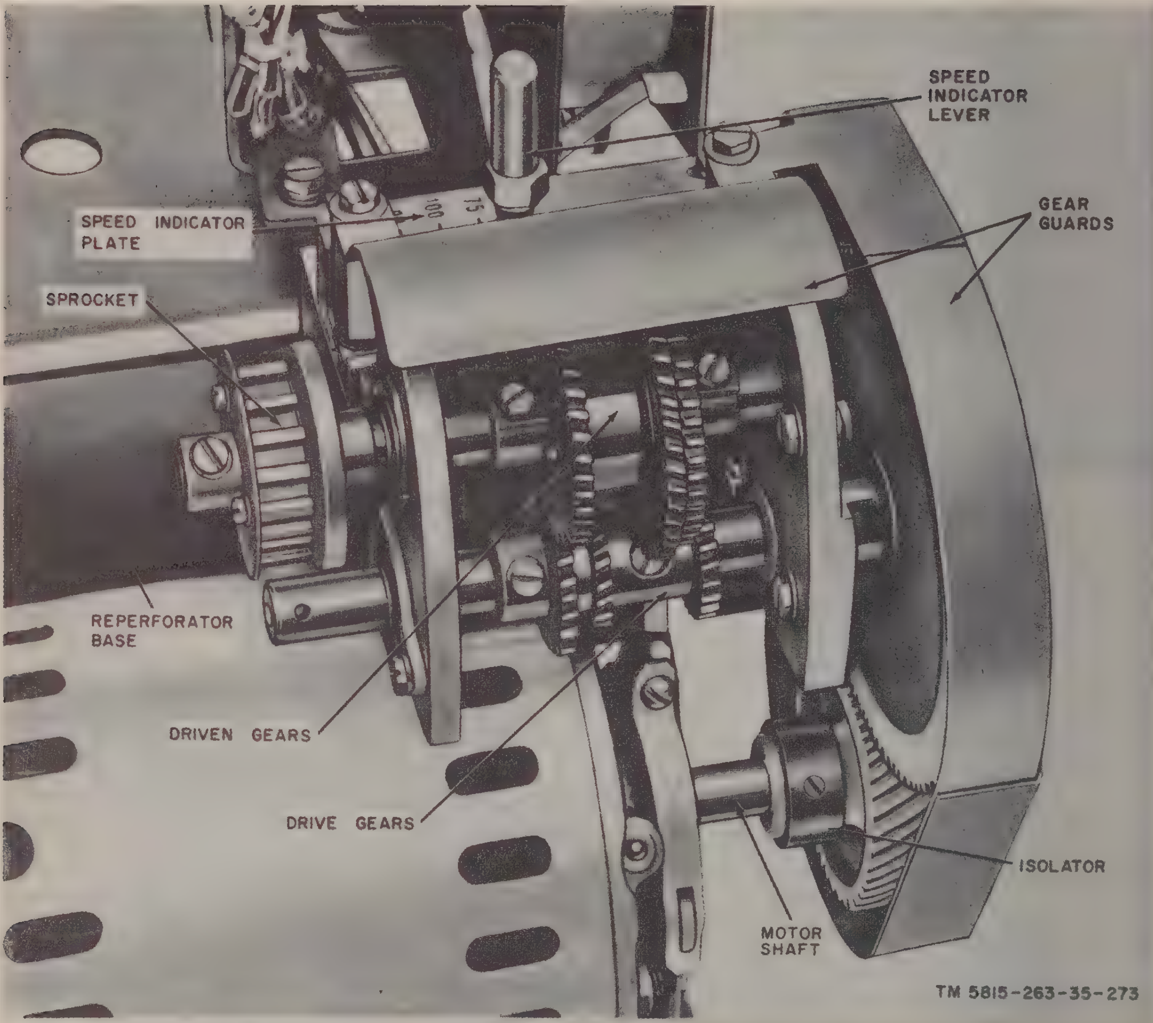

SPEED INDICATOR LEVER
GEAR GUARDS
SPEED INDICATOR PLATE
100
75
SPROCKET
REPERFORATOR BASE
DRIVEN GEARS
DRIVE GEARS
ISOLATOR
MOTOR SHAFT
TM 5815-263-35-273

Figure 458. Reperforator gear shift mechanism, rear view.

forations and a printed character. The reperforator main shaft is driven by a separate motor unit to provide the motive power required to perform the operations described above.

702. Reperforator Motor Unit

The operating mechanisms of the reperforator are driven by a synchronous motor unit mounted on the reperforator base. This motor is the same as the equipment motor unit (par. 643) in all features except the horsepower rating, which is $\frac{1}{20}$, and the length of the rotor shaft, which is slightly shorter. The description given in paragraph 643 will hold true for all other points.

703. Mechanical Power Distribution

a. General. Mechanical motion from the reperforator motor unit is transferred from the motor shaft (fig. 458) through the gear shift mechanism and an associated timing belt arrangement to the sprocket of the function cam-clutch assembly in the reperforator unit. The rocker bail assembly accepts the motion and distributes it within the reperforator to accomplish the various actions concerned with the punching and printing of tape.

b. Gear Shift Mechanism (fig. 452). The gear shift (variable speed drive) mechanism is mounted on the rear of the reperforator base, and permits instantaneous adjustment of the reperforator operating speed. The motor drive gear drives the main driven gear on the lower shaft of the gear shift mechanism. The three gears fastened to this shaft are considered as the driving gears. From right to left (as shown in figure 458), the first gear drives at 75 wpm, the second at 60 wpm, and the third at 100 wpm. The upper shaft contains the three driven gears. These are so arranged that they will clear the non-mating gears during the shifting operation, yet will mate for the selected ratio or operating speed. From right to left (as shown in the illustration), the gears on the top shaft are: The driven gear for 75 wpm, the gear for 60 wpm, and the gear for 100 wpm. The three driven gears are not connected directly to the upper shaft but are fixed to a sleeve which is keyed to the upper shaft. The sleeve is free to be moved so that gears can be meshed as desired. Between the second and third driven gears and separated from the gears is a gear shift stud connected to the gear shift slide block to which the speed selector is lever fastened. Depressing the spring-loaded speed selector lever, releases the three-position detent stud in the bottom of the gear shift slide and permits movement of the speed selector lever to the right or left as required to select a different gear ratio. The selected ratio is indicated by the matching of index lines on the gear shift slide block and the speed indicator plate on the gear shift slide. Releasing the speed selector lever locks the detent and stud holds the mechanism in the selected position.

c. Function Cam-Clutch and Clutch Trip Assembly. The function cam-clutch and clutch

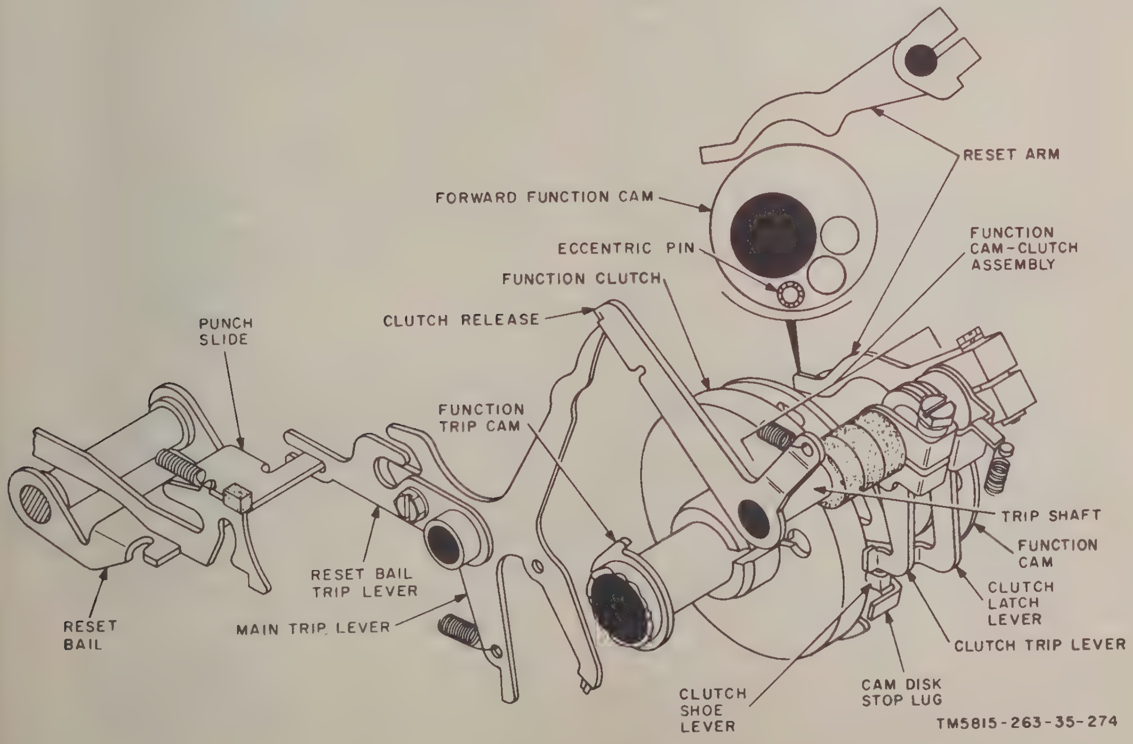

RESET ARM
FORWARD FUNCTION CAM
ECCENTRIC PIN
FUNCTION CLUTCH
FUNCTION CAM-CLUTCH ASSEMBLY
PUNCH SLIDE
CLUTCH RELEASE
FUNCTION TRIP CAM
TRIP SHAFT
FUNCTION CAM
RESET BAIL TRIP LEVER
CLUTCH LATCH LEVER
RESET BAIL
MAIN TRIP LEVER
CLUTCH TRIP LEVER
CLUTCH SHOE LEVER
CAM DISK STOP LUG
TM5815-263-35-274

Figure 459. Reperforator function cam-clutch and clutch trip assembly.

trip assembly is operated as described in paragraph 660*b*, except that the main trip lever (fig. 459) is rotated clockwise by the selector cam-clutch when the function trip cam raises the follower lever near the end of the selecting cycle. Immediately, the lower part of the function trip cam allows the follower lever to return to its unoperated position, and the main trip lever is free to move under the clutch release when the trip shaft raises the release.

d. Rocker Bail Assembly. The rocker bail assembly distributes motion from the function cam-clutch for perforating functions as described in paragraph 660*c*.

704. Selector Mechanism

The selector mechanism is made up of the selector and the selector cam-clutch assembly. As with the typing unit selector mechanism, it translates the electrical signaling code into mechanical arrangements suitable for use in the printing and perforating action of the reperforator unit. The reperforator selector cam-clutch assembly differs from the one in the typing unit (par. 683) only in that the last cam (fig. 459) operates as the function trip cam. Clutch operation is as described in paragraph 645. The selector linkages (fig. 461) are similar to those described in paragraph 683 through the positioning of selected push levers. The selected push levers, in moving to the left, rotate associated punch slide latches counterclockwise (fig. 461). Just before the fifth push lever is selected, the selecting cam, through the function clutch trip assembly, causes the reset bail to release the punch slides. The unselected punch slide latches keep their associated punch slides to the right, while the selected punch slide latches permit their punch slides to move to the left under spring tension. During the slides to their unselected position, the punch slide latches return to their unselected position when the selected push levers are repositioned at the beginning of the next cycle.

705. Transfer Mechanism

Near the end of each selecting mechanism cycle, the transfer mechanism moves the intelligence, in the form of a mechanical arrangement, from the punch slides to the function box and positioning mechanisms. The procedure is

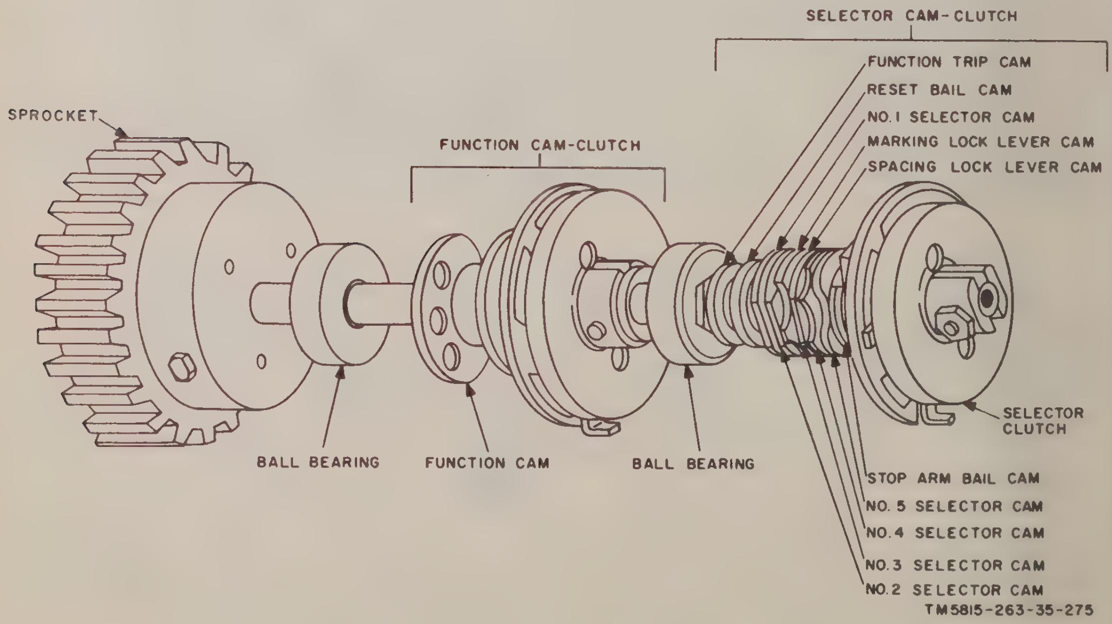

SELECTOR CAM-CLUTCH
FUNCTION TRIP CAM
RESET BAIL CAM
NO. 1 SELECTOR CAM
MARKING LOCK LEVER CAM
SPACING LOCK LEVER CAM
SPROCKET
FUNCTION CAM-CLUTCH
SELECTOR CLUTCH
BALL BEARING
FUNCTION CAM
BALL BEARING
STOP ARM BAIL CAM
NO. 5 SELECTOR CAM
NO. 4 SELECTOR CAM
NO. 3 SELECTOR CAM
NO. 2 SELECTOR CAM
TM5815-263-35-275

Figure 460. Reperforator main shaft.

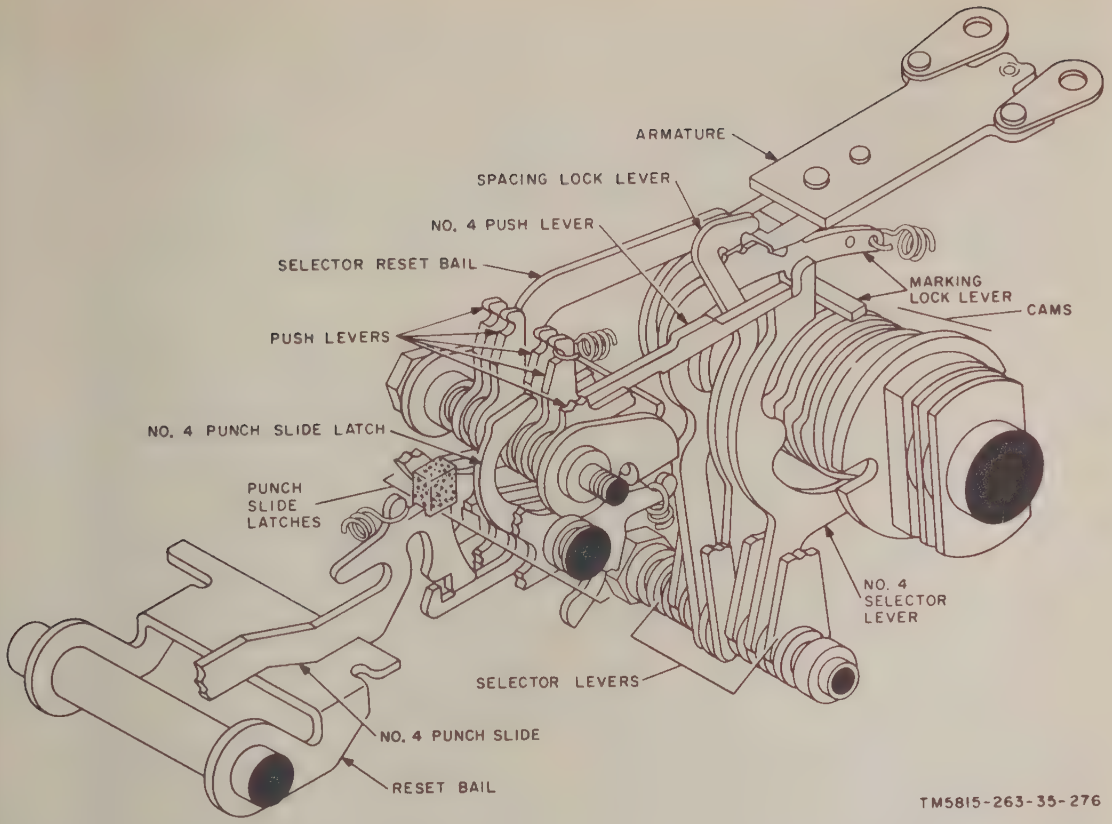

ARMATURE
SPACING LOCK LEVER
NO. 4 PUSH LEVER
SELECTOR RESET BAIL
PUSH LEVERS
MARKING LOCK LEVER
CAMS
NO. 4 PUNCH SLIDE LATCH
PUNCH SLIDE LATCHES
NO. 4 SELECTOR LEVER
SELECTOR LEVERS
NO. 4 PUNCH SLIDE
RESET BAIL
TM5815-263-35-276

Figure 461. Selector mechanism.

the same as described in paragraph 661. The linkages are identical in the perforator and reperforator.

706. Punch Mechanism

The punch mechanism punches feed holes, advances tape, and perforates combinations of chadless holes corresponding to the code combinations received from the signal line. Intelligence is received from the selector mechanism by the punch slides, and is advanced and perforated in the same manner as that described in paragraph 662.

707. Typewheel Positioning, Printing and Ribbon Mechanisms

Typing, printing, and ribbon mechanisms of the reperforator are identical to those of the perforator. The descriptions given in paragraphs 663 through 670 cover these mechanisms. The only difference is found in the function box which, in the reperforator, is equipped with a signal bell mechanism (par. 708) in addition to the letters-figures shift mechanism (par. 668).

708. Signal Bell Mechanism

a. The signal bell mechanism provides a method of operating the signal bell (in the reperforator electrical service unit) on reception of an appropriate code. The circuit to the reperforator signal bell DS6 is controlled by a set of normally-open contacts of a signal bell function switch S18 mounted on the function box.

b. When the positioning mechanisms are in the figures position and the "S" code impulse is received at the selector mechanism, the number 1 and 3 bell cranks rotate in response to the marking impulses and the number 5 bell crank rotates in response to a spacing impulse.

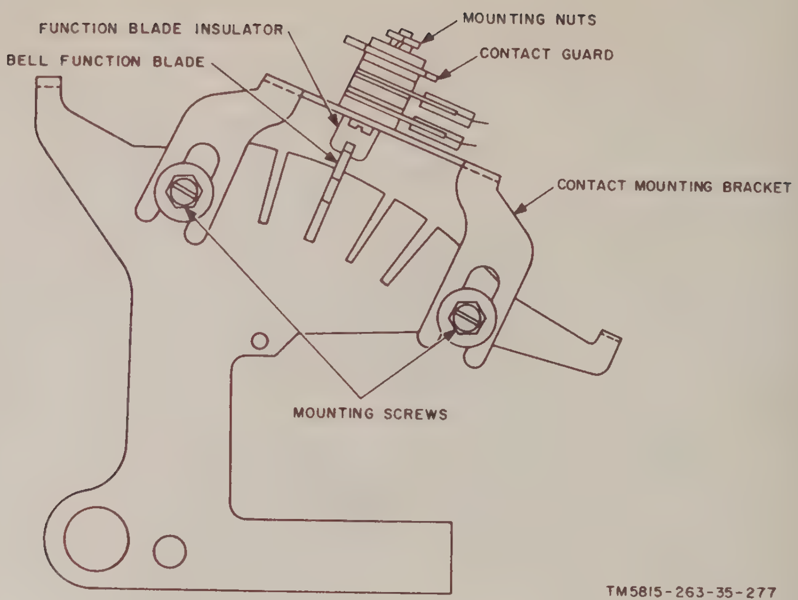


Figure 462. Signal bell mechanism.

In this position, the slotted arms at the top of the bell crank permit the signal bell function blade, installed in the slots behind the letters function blade, to drop in the same manner as described in paragraph 668*b*(1). The contact fixed to the signal bell function blade drops with the blade and permits the normally-open signal bell switch to close, energizing the circuit to the signal bell DS6. See paragraph 717*c* for circuit theory.

c. The following sequence chart lists the operations for the signal bell function.

Signal Bell Sequence Chart

1	Positioning mechanism in figures (upper case) position and S code impulse is received.
2	Numbers 1, 3, and 5 bell cranks move
3	Signal bell function blade moves down
4	Contacts of signal bell function switch S18 close
5	Circuit is completed to the signal bell DS6

709. Blank Tape Feedout

The blank tape feedout feature is provided with the reperforator to provide a means of feeding a length of tape out of the unit before the start or at the end of a message. When the pushbutton of the tape feedout switch S19 is closed, a shunt is placed across the selector magnet circuit. As a result, the selector armature is deenergized, simulating a blank code signal, and tape is fed out until the pushbutton is released. Refer to paragraph 718*b*(3) for circuit theory.

Section IV. ELECTRICAL THEORY OF TELETYPEWRITER SET AN/FGC–56

710. General

The circuitry of the Teletypewriter Set AN/FGC–56 is divided into the following five circuit groups: ac circuits, dc and signal circuits (line relay included), dc and signal circuits (direct magnet operation), local test circuit (line relay included), and local test circuit (direct magnet operation). Figures 463 through 475 are simplified schematic diagrams of these circuit groups. The airline wiring diagram and a complete schematic diagram of the teletypewriter circuits are included at the end of Section V of this chapter. It is highly recommended that all maintenance personnel become thoroughly familiar with the electrical theory for this equipment and to use the schematic diagrams available for all circuit analysis work. The theory will be more easily understood, if read from start to finish at the first reading.

711. Ac Circuits

The ac power applied to the teletypewriter set is directly available at the convenience outlet J4 and activiates the copy lamps when the copylight switch S1 is placed in the MAINT ON position. With copylight switch S1 in the NORMAL ON position and the power switch S3 in the closed or ON position, the ac power will activate the copylight lamps, the line shunt relay K1, the main motor unit B1, and the transformer T2. For convenience of the circuit theory which follows, ac power may be considered present between terminals 3 and 6 of TB12 (fig. 481) when the power switch S3 is in the ON position. Power is normally removed from these terminals only when the stop magnet E1 is energized or the power switch S3 is placed in the open or OFF position. The ac power is utilized further for circuit operation and is discussed for each particular circuit in the paragraphs following.

a. Convenience Outlet, Fuse, Copylight, and End-of-Line Indicator Circuits (fig. 463).

(1) The ac input circuit is traced from the power line suppressor Z2 to terminals 39 and 40 on TB2. The convenience outlet J4 is connected directly across terminals 39 and 40 of TB2 and is not fused for protection. The fuse F2 is in the "hot" or ungrounded side of the ac input power between terminal 39 on TB2 and pin 2 of the power switch S3. Locating the fuse F1 at this point provides protection for the internal ac circuits. The power line suppressor Z2 provides a grounding path for any high frequencies which might be conducted from the internal circuits of the teletypewriter to the external power source and cause interference in any other equipments using this same source.

(2) The copylight circuit provides illumination during normal operation and maintenance operation. The three-position copylight switch S1 determines how the lamps will operate. In the center or OFF position, one side of the primary winding of transformer T1 is open and the lamps will not light. When the switch S1 is in the down or MAINT ON position, current flows from terminal 39 through the fuse F2, then through the switch S1 contacts 1 and 2, through the primary of the step-down transformer T1 to terminal 40 on TB2 completing the circuit. When the switch S1 is in the up or NORMAL ON position and the power switch S3 is in the closed or ON position, current flows from terminal 39 through the fuse F2, through the power switch S3 contacts 2 and 3 to terminal 2 on TB12, through the normally closed contacts 3 and 4 of E3 in the motor control assembly, through terminal 3 to 4 of TB12, then from terminal 4 on TB12 to contacts 3 and 2 of the switch S1 and through transformer T1 to terminal 40 on TB completing the circuit.

(3) The end-of-line indicator circuit provides a warning light to make the operator aware of the typing space available at the end of each typed line of copy. In a normally adjusted typing unit, when the 66th character is typed, the end-of-line indicator switch S9 (page copy) is mechanically closed to complete the ac power circuit to the end-of-line lamp DS4. Current flow for the lamp is from terminal 145 of TB4 through the lamp to pin 6 of connectors P1/J1, through the end-of-line indicator selector switch S6 contacts 2 to 3, through the end-of-line indicator switch S9 contacts 1 to 2, and back to terminals 143, 146, and 147 on TB4 completing the circuit, through pin 8 of connectors P1/J1.

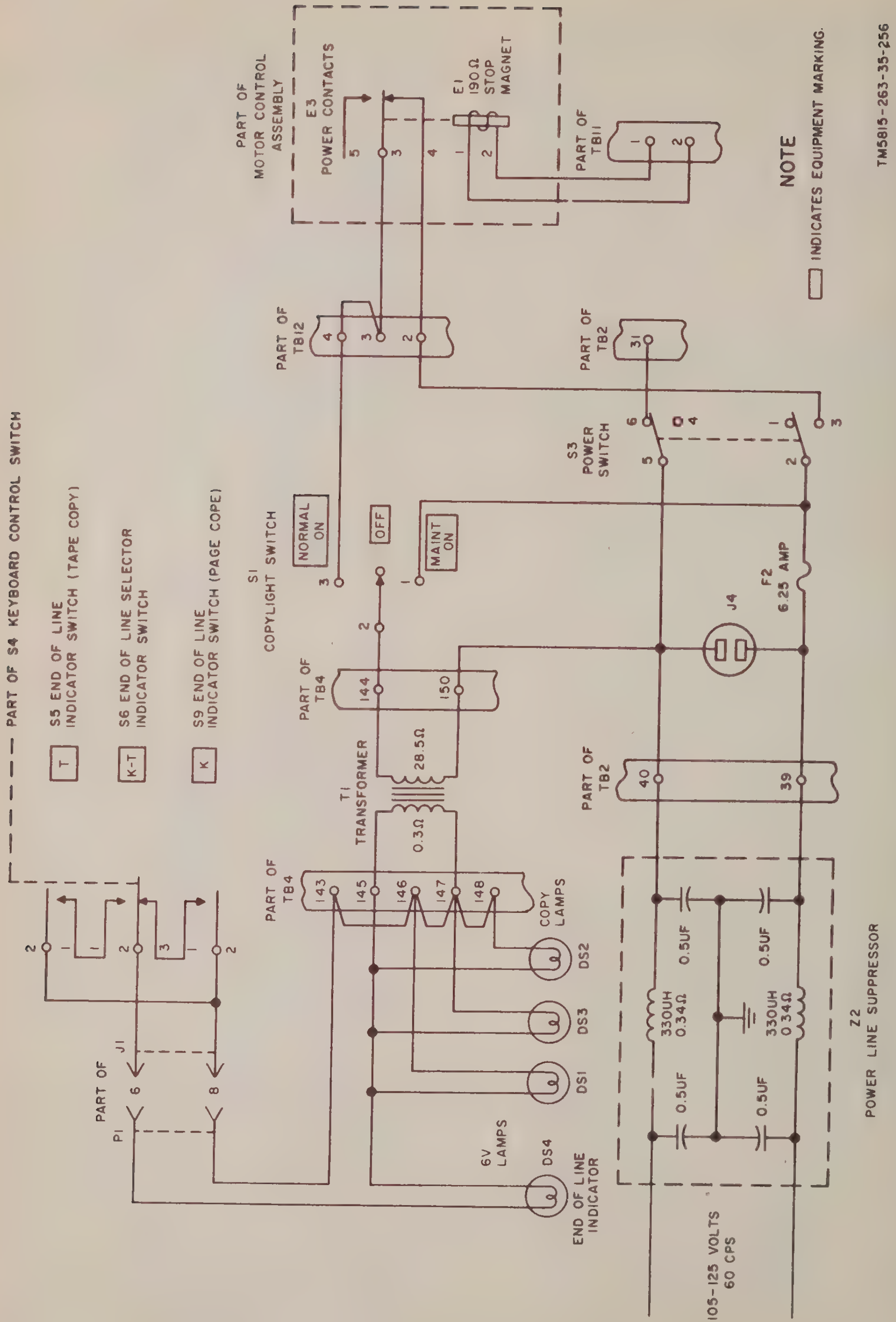

PART OF S4 KEYBOARD CONTROL SWITCH
T
S5 END OF LINE INDICATOR SWITCH (TAPE COPY)
K-T
S6 END OF LINE SELECTOR INDICATOR SWITCH
K
S9 END OF LINE INDICATOR SWITCH (PAGE COPE)
PART OF P1
PART OF J1
6
8
6V LAMPS
DS4
END OF LINE INDICATOR
DS1
DS3
DS2
COPY LAMPS
PART OF TB4
143
145
146
147
148
T1 TRANSFORMER
0.3Ω
28.5Ω
144
150
S1 COPYLIGHT SWITCH
NORMAL ON
OFF
MAINT ON
PART OF TB12
PART OF MOTOR CONTROL ASSEMBLY
E3 POWER CONTACTS
E1 190Ω STOP MAGNET
PART OF TB11
PART OF TB2
31
S3 POWER SWITCH
J4
F2 6.25 AMP
40
39
0.5UF
330UH 0.34Ω
Z2 POWER LINE SUPPRESSOR
105-125 VOLTS 60 CPS
NOTE
INDICATES EQUIPMENT MARKING.
TM5815-263-35-256

Figure 463. Convenience outlet, fuse, copylight, and end-of-line indicator circuits, simplified schematic diagram.

b. Transformer Primary, Line Shunt Relay K1, and Signal Bell Circuits (fig. 464).

(1) The transformer T2 is a one-to-one power isolation transformer providing the rectifier circuit with a 115-volt source for rectification. When the power switch S3 is placed in the closed or ON position, current flows from the power switch S3 contact 3 to terminal 2 of the transformer T2, through the primary to terminal 1 of the transformer T2 and to terminal 9 of TB12. The circuit is completed from terminal 6 of TB12 back to the other side of the power switch S3.

(2) The line shunt relay K1 provides a circuit action which insures continuity of the signal line circuit at all times. The relay K1 is energized whenever power is applied to the teletypewriter set and places the equipment in series with the signal line circuit. When ac power is removed at the local teletypewriter, relay K1 is deenergized and shunts the signal line circuit past the line relay K2. When the power switch S3 is in the closed or ON position, ac power is present at terminals 4 and 8 of TB12. Current flow is from terminal 4 of TB12 to terminals 37 and 34 of TB2, from terminal 34 to pin 14 of connectors P3/J3, then pins 23 and 22 of connectors P4/J4, then pin 17 of connectors P3/J3, then pins 4 and 7 of connectors P1/J1 then pins 14 and 17 of connectors P2/J2 through the relay coil, pins 5 to 4 of K1 (1250 ohms), and back to terminal 8 of TB12 completing the circuit.

(3) The signal bell circuit provides a means of alerting the operator at a remote teletypewriter set by the ringing of the bell. When the signal bell function switch S12 is activated as described in paragraph 697*b*, ac power flows from terminal 3 of TB12 through pin 2 of connectors P2/J2, through the contacts of switch S12, through pin 7 of connectors P2/J2 to terminal 5 of TB12, from terminal 5 of TB12 to terminal 30 of TB2 through the bell coil to terminal 29 of TB2 and back to terminal 9 of TB12 to complete the circuit.

c. Main Motor, Motor Stop, and Selective Calling Circuits (fig. 465).

(1) The motor circuit provides the synchronous main motor unit B1 with the necessary current to drive the motor. A general description of the motor unit is found in paragraph 643. When the power switch S3 is in the closed or ON position, current flow from terminal 4 of TB12 through pin 12 of connectors P1/J1 to terminal 1 to TB15, through the motor components as described in paragraph 643 to terminal 2 of TB15 and through pin 13 of connectors P1/J1 to terminals 7 and 6 of TB12 to complete the circuit.

(2) The motor stop circuit provides a convenient method of stopping operation of all teletypewriter sets connected in the line. When the motor stop function switch S13 is activated as described in paragraph 698, ac power flows from terminal 40 of TB2 to terminals 2 and 3 of TB11, from terminal 2 of TB11 through the stop magnet coil E1 (190 ohms) to terminal 1 of TB11, through pin 5 of connectors P2/J2, then through the contacts 1 and 2 of the motor stop function switch S13, to pin 8 of connectors P2/J2, to terminals 33 and 35 of TB2, and from terminal 35 of TB2 to contact 3 of the power switch S3 to complete the circuit. Power switch S3 remains in the ON position. The stop magnet E1 energizes briefly and opens the contacts of E3 (power contacts) to remove ac power from the motor, the power supply transformer, the line shunt relay, and the copy lamps and all operation stops. A second set of contacts are closed when E3 opens in order to utilize the line current as a holding force to maintain the stop condition. When the line cur-

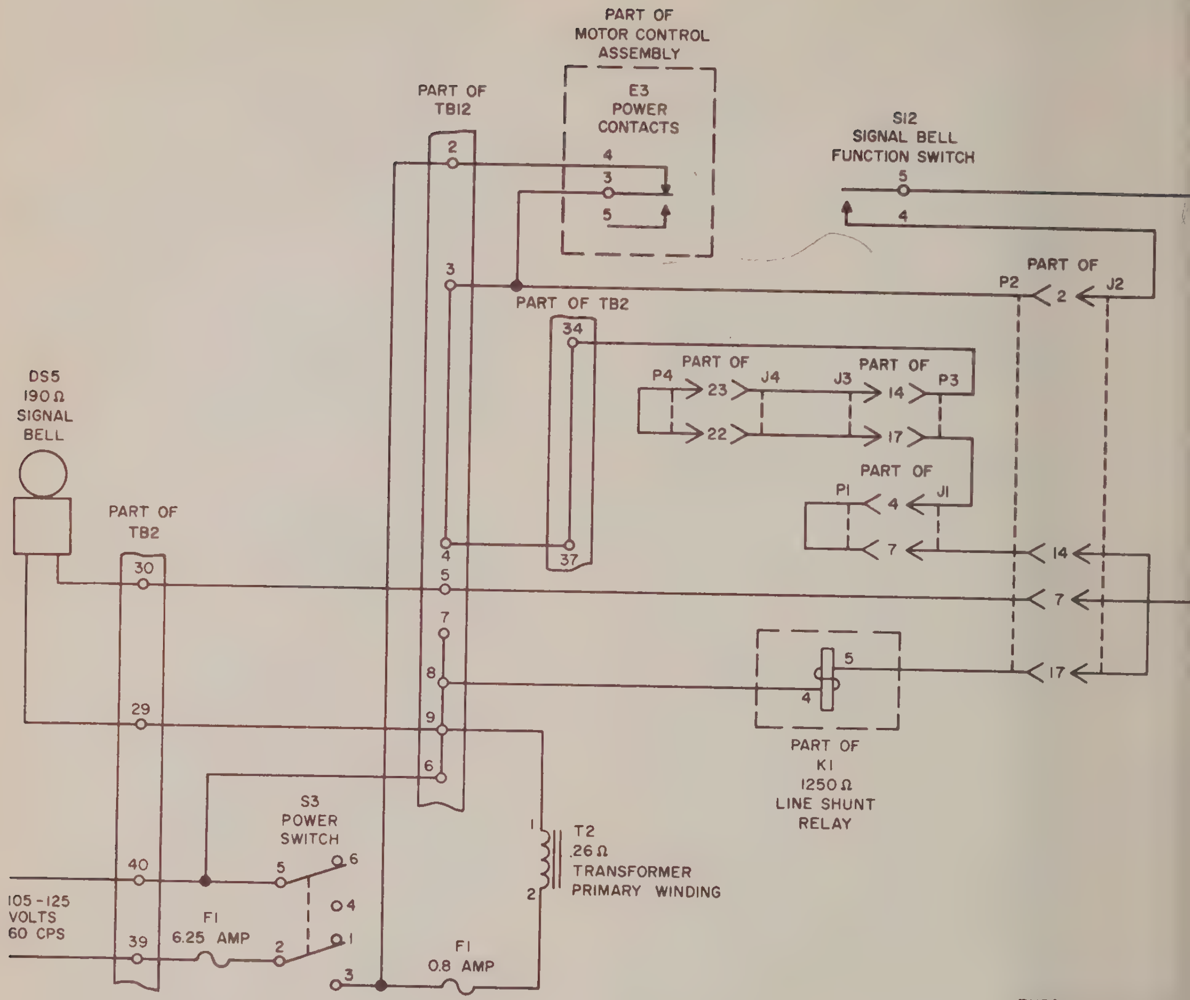
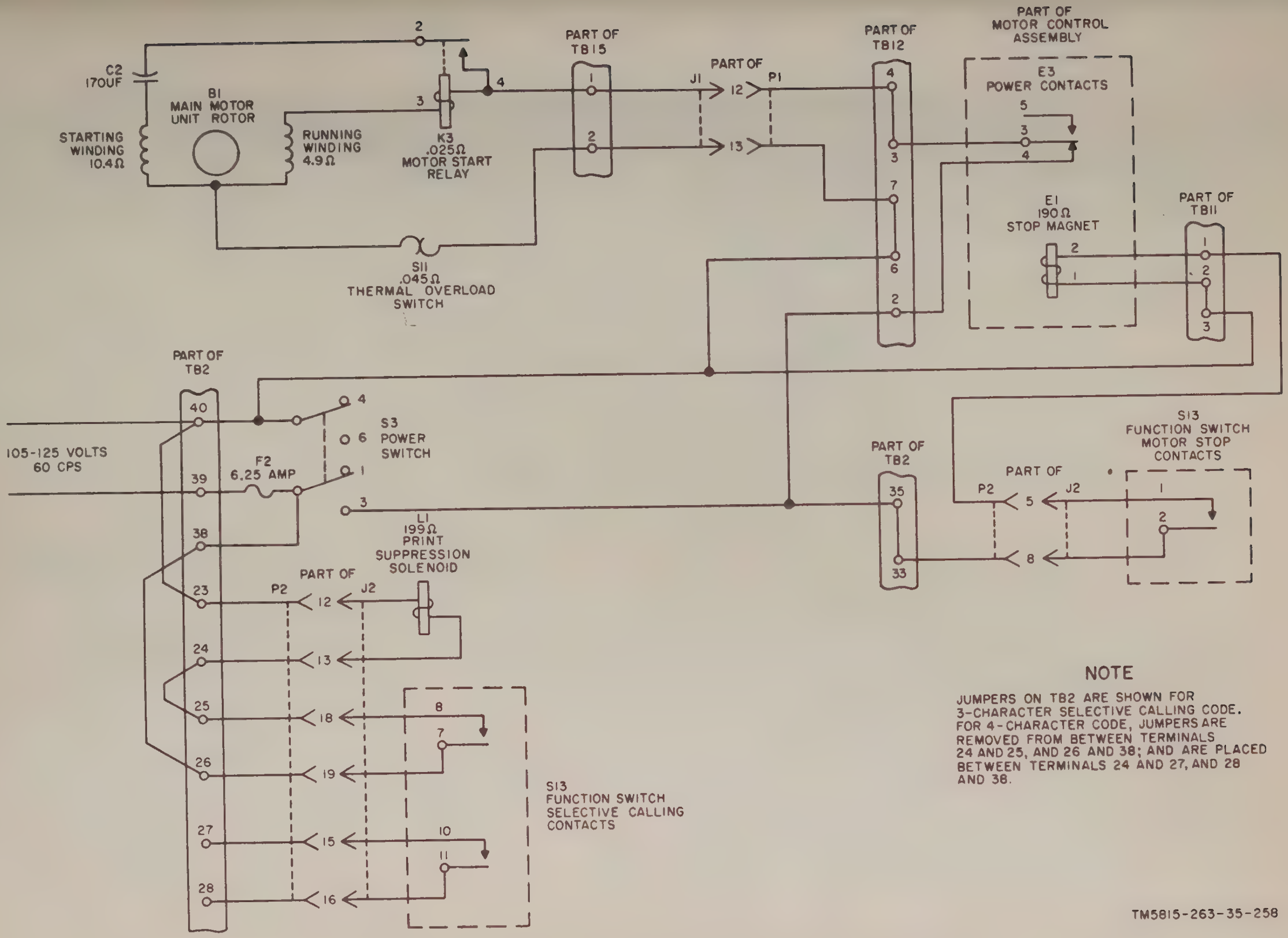

PART OF MOTOR CONTROL ASSEMBLY
E3 POWER CONTACTS
PART OF TB12
S12 SIGNAL BELL FUNCTION SWITCH
PART OF TB2
PART OF P2 J2
PART OF P4 J4
PART OF J3 P3
PART OF P1 J1
DS5 190 Ω SIGNAL BELL
PART OF TB2
PART OF K1 1250 Ω LINE SHUNT RELAY
S3 POWER SWITCH
T2 .26 Ω TRANSFORMER PRIMARY WINDING
105-125 VOLTS 60 CPS
F1 6.25 AMP
F1 0.8 AMP
TM5815-263-35-257

Figure 464. Transformer primary, line shunt relay K1, and signal bell circuits, simplified schematic diagram.

rent is momentarily interrupted, at any station on the line, the stop condition is removed and power is applied to each teletypewriter set on the line. The line break switch S7 is used to accomplish the signal line interruption, and when the switch is activated, the send-receive switch S10 (fig. 472) is placed in the receive position through mechanical linkage in the keyboard base. The circuit operation for the motor control starting circuit is described in paragraph 712*a*.

(3) The selective calling circuit (when used) provides a means of allowing the transmitting source to choose any number, or all, of the equipments in the line to receive a given message. When the selective calling function switch S13 is activated as described in paragraph 699, ac power flows from terminal 40 to terminal 23 of TB2 (fig. 465), through pin 12 of connectors P2/J2, through the print suppression solenoid L1 (199 ohms) to pin 13 of connectors P2/J2, to terminals 24 and 25 or 27 of TB2,


C2
170UF
B1
MAIN MOTOR
UNIT ROTOR
STARTING
WINDING
10.4Ω
RUNNING
WINDING
4.9Ω
K3
.025Ω
MOTOR START
RELAY
S11
.045Ω
THERMAL OVERLOAD
SWITCH
PART OF
TB15
PART OF
J1
P1
PART OF
TB12
PART OF
MOTOR CONTROL
ASSEMBLY
E3
POWER CONTACTS
E1
190Ω
STOP MAGNET
PART OF
TB11
PART OF
TB2
105-125 VOLTS
60 CPS
F2
6.25 AMP
S3
POWER
SWITCH
L1
199Ω
PRINT
SUPPRESSION
SOLENOID
PART OF
P2
J2
S13
FUNCTION SWITCH
SELECTIVE CALLING
CONTACTS
PART OF
TB2
S13
FUNCTION SWITCH
MOTOR STOP
CONTACTS

NOTE

JUMPERS ON TB2 ARE SHOWN FOR 3-CHARACTER SELECTIVE CALLING CODE. FOR 4-CHARACTER CODE, JUMPERS ARE REMOVED FROM BETWEEN TERMINALS 24 AND 25, AND 26 AND 38; AND ARE PLACED BETWEEN TERMINALS 24 AND 27, AND 28 AND 38.

TM5815-263-35-258

Figure 465. Motor, motor stop, and selective calling circuits, simplified schematic diagram.

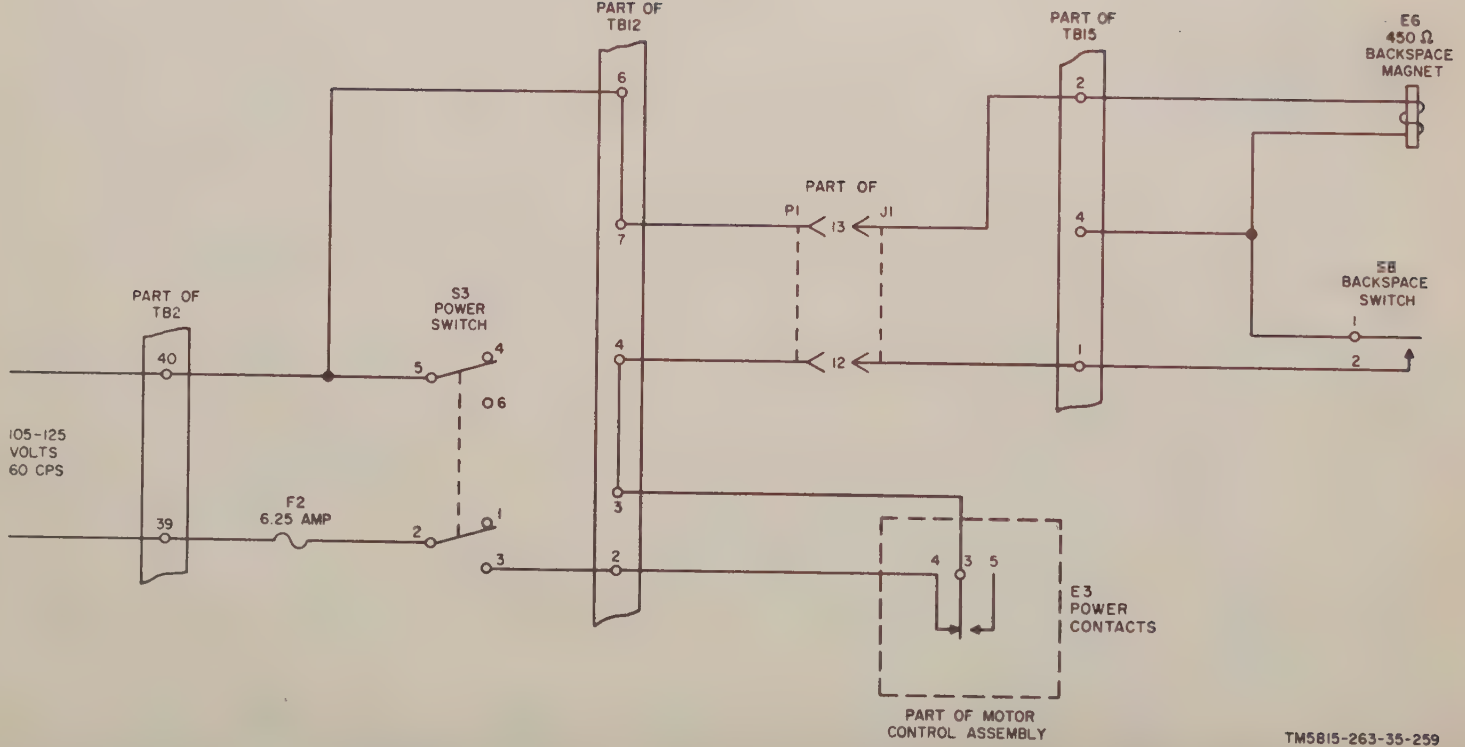

PART OF TB2
40
39
105-125 VOLTS 60 CPS
F2 6.25 AMP
S3 POWER SWITCH
5
4
6
2
1
3
PART OF TB12
6
7
4
3
2
PART OF
P1
J1
13
12
PART OF TB15
2
4
1
E6 450 Ω BACKSPACE MAGNET
S8 BACKSPACE SWITCH
1
2
4
3
5
E3 POWER CONTACTS
PART OF MOTOR CONTROL ASSEMBLY
TM5815-263-35-259

Figure 466. Perforator back space magnet circuit, simplified schematic diagram.

through pins 18 or 15 of connectors P2/J2, through the contacts of the function switch S13 to pin 19 or 16 of connectors P2/J2, to terminals 26 or 28 and 38 of TB2 and to contact 2 of the power switch S3 to complete the circuit. The solenoid L1 becomes energized and withdraws the blocking bail lever (fig. 454) to permit operation of the type box clutch. The selective calling function switch S13 remains closed until an end-of-message code (3 blanks) is received as described in paragraph 700.

d. Perforator Back Space Circuit (fig. 466).

(1) The perforator back space magnet circuit provides the means of allowing the operator to back space the perforated and printed tape for a correction. A complete description of mechanical operation is given in paragraphs 652 and 671.

(2) When the power switch S3 is set to the closed position, and the back space switch S8 is activated as described in paragraph 652, current flow is from terminal 39 of TB2 through contacts 2 and 3 of power switch S3 to terminal 2 of TB12, through the closed contacts 3 and 4 of power contacts E3 to terminals 3 and 4 of TB12, from terminal 4 of TB12 to pin 12 of connectors P1/J1 to terminal 1 of TB15, through the closed contacts 2 and 1 of the back space switch S8, through the back space magnet coil E6 (450 ohms) to terminal 2 of TB15, through pin 13 of connectors P1/J1 to terminals 7 and 6 of TB12, and from terminal 6 of TB12 back to terminal 40 of TB2 to complete the circuit.

e. Transmitter Distributor Ac Circuits (fig. 467).

(1) The transmitter distributor ac circuits provide the operating controls necessary for the starting, stopping, and sensing of tape movement through the transmitter distributor. A complete description of mechanical operation is given in paragraphs 673 through 681.

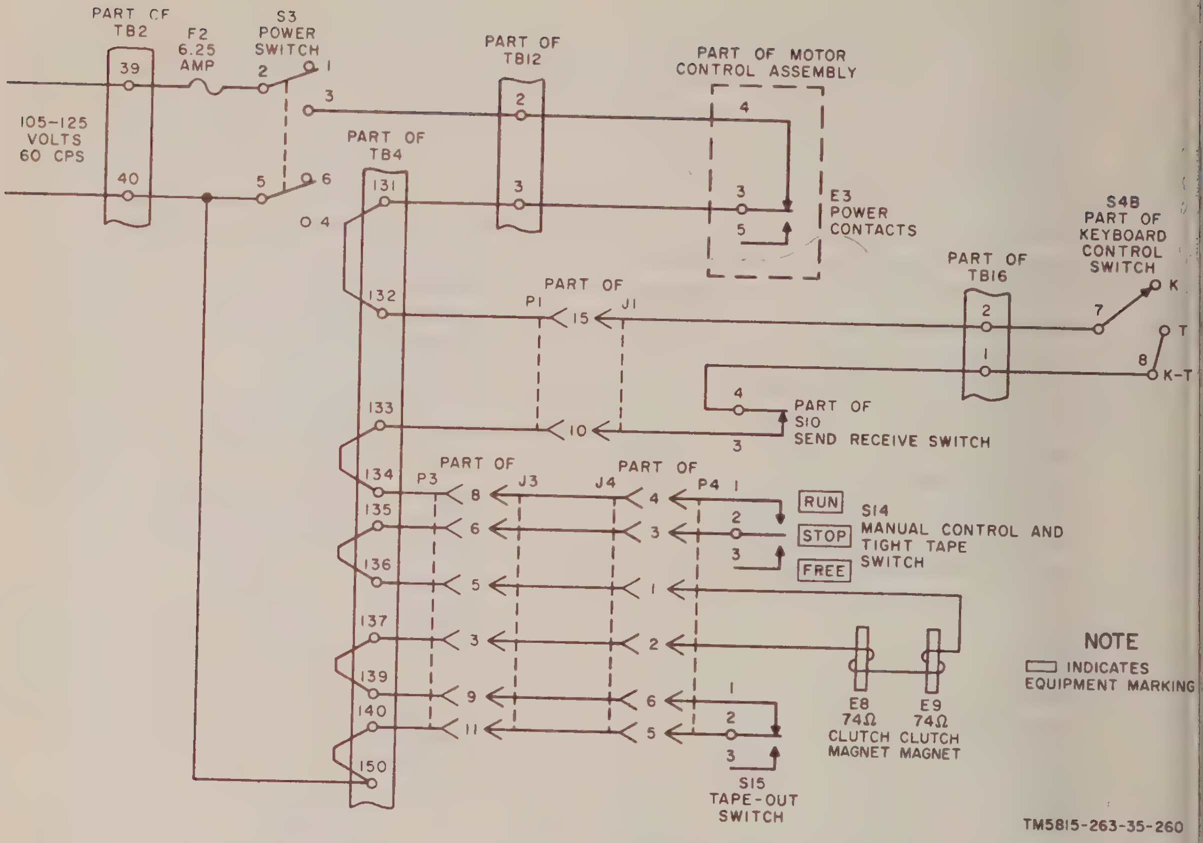
(2) For the ac circuit to be in complete continuity, the keyboard control switch S4 must be in the K-T or T position, the send-receive switch S10 in the SEND position, the manual control and tight tape switch S14 in the RUN position, the tape out switch S15 contacts 2 to 1 closed, the power switch S3 in the ON position, and E3 power contacts 3 to 4 closed.

(3) Given the conditions in (2) above, current flow is from terminal 39 on TB2 (fig. 467) through power switch S3 to the power contacts of E3, through the contacts 7 to 8 of switch S4B, through the contacts 4 to 3 of switch S10, through the contacts 1 to 2 of switch S14, through the clutch magnets E8 and E9 in series (148 ohms), through the contacts 1 to 2 of switch S15 and back to terminal 40 on TB2 to complete the circuit path. The clutch magnets become energized and operate as described in paragraph 673. The following list references paragraphs describing the mechanical operations of the switches shown in figure 467.

Item	Paragraph
Switch S4	658*b*
Switch S10	649 and 650
Switch S14	679 and 680
Switch S15	681

712. Dc and Signal Circuits (Line Relay Included)

The dc power developed in the power supply is used to supply bias current to the line relay for either a 60 ma or a 20 ma signal line current, for energizing the selector magnets E11 and E12 when the line relay is energized by code signals, for signal current in a local operation of the line-test circuit (par. 714), and to energize the start magnets E4 and E5 in the stop condition during local operation of the line-test circuit. The dc power from the power supply is not used in the signal line circuit due to the complex balance of signal line current necessary for each net or group of teletypewriter sets on the line; therefore an ex-



PART OF TB2
39
40
F2 6.25 AMP
S3 POWER SWITCH
1
2
3
4
5
6
105-125 VOLTS 60 CPS
PART OF TB12
2
3
PART OF MOTOR CONTROL ASSEMBLY
4
3
5
E3 POWER CONTACTS
PART OF TB4
131
132
133
134
135
136
137
139
140
150
PART OF
P1
J1
15
10
PART OF TB16
2
1
S4B PART OF KEYBOARD CONTROL SWITCH
7
8
K
T
K-T
4
3
PART OF S10 SEND RECEIVE SWITCH
PART OF
P3
J3
PART OF
J4
P4
8
6
5
3
9
11
4
3
1
2
6
5
1
2
3
RUN
STOP
FREE
S14 MANUAL CONTROL AND TIGHT TAPE SWITCH
E8 74Ω CLUTCH MAGNET
E9 74Ω CLUTCH MAGNET
1
2
3
S15 TAPE-OUT SWITCH
NOTE
▭ INDICATES EQUIPMENT MARKING
TM5815-263-35-260

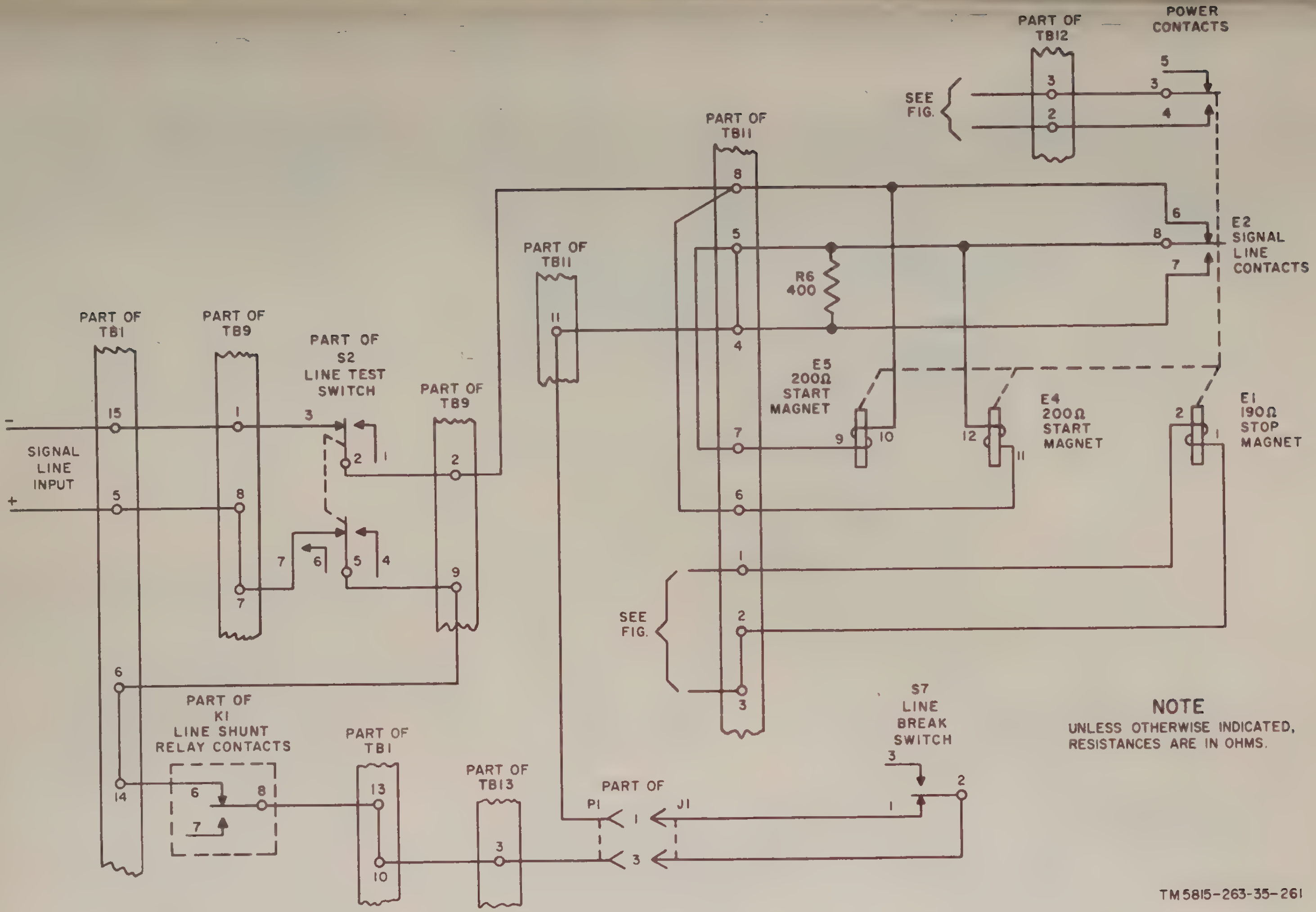
Figure 467. Transmitter distributor ac circuits, simplified schematic diagram.

ternal source maintains the 115 volt, 60 ma supply. The external dc signal is used in the teletypewriter set to energize and deenergize the line relay during a receive operation, to energize the start magnets E4 and E5 during a stop operation, and to generate a coded signal from the signal generator contacts E7 (keyboard) and E10 (transmitter distributor) when transmitting a message. The detailed usage of the dc power, signal power, and related ac power is discussed for each particular circuit in the paragraphs following.

a. Motor Control Circuit.

(1) The motor control circuit provides a means of starting operation of the equipment by interrupting the signal line current during a stop condition, and stopping operation of the equipment without setting the power switch S3 to the OFF position.

(2) In the equipment as furnished, the start magnets E4 and E5 (fig. 468) are connected in parallel for 0.060 ampere signal line current operation. For 0.020 ampere operation, the strap wires are rearranged (par. 27*a*) on TB11 to connect E4 and E5 in series. Also, the strap across the line balancing resistor R6 must be removed for 20 ma operation. The resistor R6 is connected into the signal line circuit by the signal line contacts E2 when the start magnet coils are switched out (deenergized), in order to compensate for the loss of their resistance and to minimize unbalance in the line circuit.


PART OF TB12
POWER CONTACTS
SEE FIG.
5
3
4
3
2
PART OF TB11
8
5
4
7
6
1
2
3
6
8
7
E2 SIGNAL LINE CONTACTS
R6 400
E5 200Ω START MAGNET
9
10
E4 200Ω START MAGNET
12
11
E1 190Ω STOP MAGNET
2
1
PART OF TB11
11
PART OF TB1
15
5
6
14
PART OF TB9
1
8
7
PART OF S2 LINE TEST SWITCH
3
2
1
7
6
5
4
PART OF TB9
2
9
SIGNAL LINE INPUT
−
+
PART OF K1 LINE SHUNT RELAY CONTACTS
6
8
7
PART OF TB1
13
10
PART OF TB13
3
PART OF
P1
J1
1
3
SEE FIG.
S7 LINE BREAK SWITCH
3
1
2

NOTE
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

TM5815-263-35-261

Figure 468. Electrical motor control circuit, simplified schematic diagram.

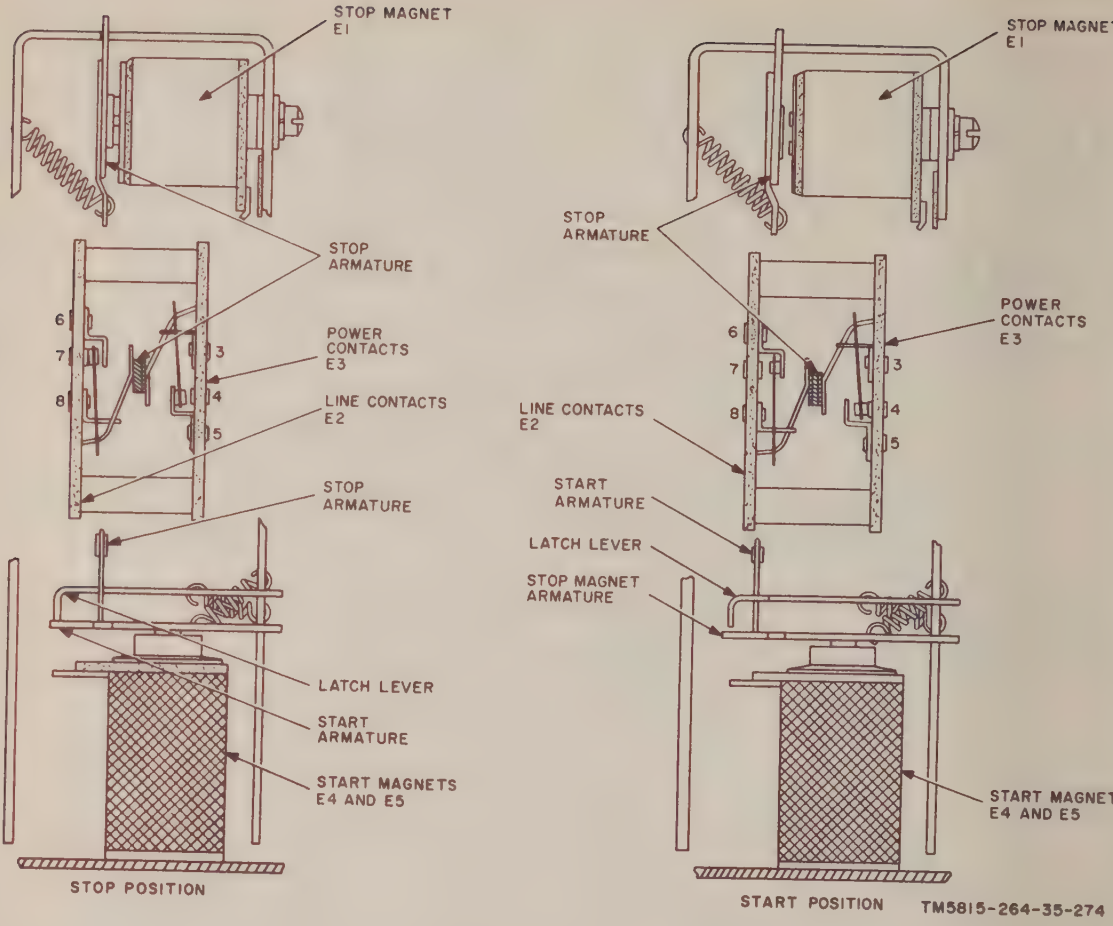

STOP MAGNET E1
STOP ARMATURE
6
7
8
3
4
5
POWER CONTACTS E3
LINE CONTACTS E2
STOP ARMATURE
LATCH LEVER
START ARMATURE
START MAGNETS E4 AND E5
STOP POSITION
STOP MAGNET E1
STOP ARMATURE
POWER CONTACTS E3
6
7
8
3
4
5
LINE CONTACTS E2
START ARMATURE
LATCH LEVER
STOP MAGNET ARMATURE
START MAGNETS E4 AND E5
START POSITION
TM5815-264-35-274

Figure 469. Electrical motor control mechanism, pictorial diagram.

(3) The stop circuit operates as described in paragraph 711*c*(2) above and all operations stop as follows. The contacts 3 to 5 of E3 and 8 to 7 of E2 (fig. 469) mate by the action of the stop magnet armature closing to the stop magnet E1. Contacts 3 to 5 of E3 (fig. 457) open the ac input circuit to the motor, copy lamps, power supply, and line shunt relay. Contacts 8 to 7 (fig. 468) place the parallel start magnets E4 and E5 in the signal line circuit. DC power flows through the line test switch S2, both start magnets, the line break switch S7, the line shunt relay K1, and back through the line test switch S2, as shown in figure 468, to energize the start magnets.

(4) The start magnet armature (fig. 469) is pulled downward to allow the latch lever to engage the stop magnet armature and hold it in the stop position.

(5) This stop position is changed to the start position when the line break switch S7 is depressed and released. The signal line is momentarily opened, the start magnets deenergize, and the start magnet armature is released. When the start magnet armature moves upward, it carries the latch

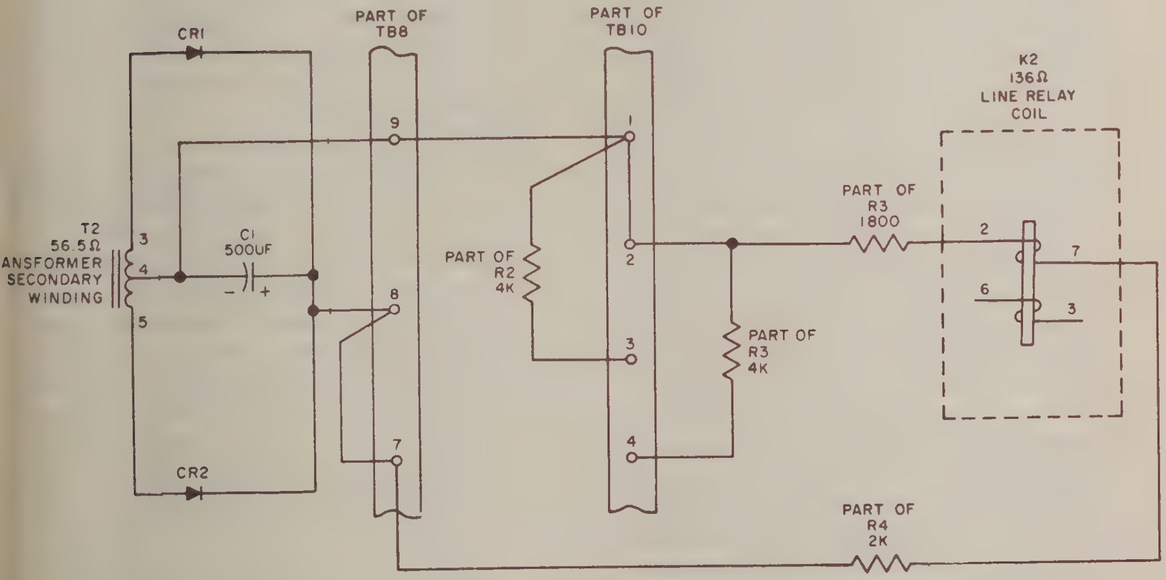
lever with it. The latch lever in turn releases the stop magnet armature. The stop magnet armature swings away from the stop magnet to close contacts 3 to 4 of E3 and 8 to 6 of E2.

(6) Contacts 3 to 4 of E3 restore ac power to the equipment and contacts 8 to 6 of E2 shunt the start magnets from the signal line circuit. A complete cycle from start to stop and back to start has thus been effected.

b. Dc Power Supply and Line Relay K2 Bias Coil Circuits.

(1) The dc power supply provides a 150 ma (maximum), 115-volt dc source for circuit operation. When ac power is applied to the primary winding of the isolation power transformer T2, the one-to-one turn ratio causes a 115 volt ac signal across the secondary winding of the transformer. The rectifiers CR1 and CR2 are connected for full-wave rectification and develop the 115 volts dc across the capacitor C1 (fig. 470). A constant current drain of 0.060 ampere is placed upon the power supply by a 0.030 ampere flow through the bias coil circuit and a 0.030 ampere flow through either a shunt network or the selector magnets circuit when the line relay K2 changes from spacing to marking.

(2) The bias coil circuit provides either a 0.030 ampere or a 0.010 ampere current flow through the bias coil winding, pins 2 to 7, of the line relay K2. Figure 470 shows the 0.030 ampere dc current path from the negative side of the power supply to TB8, to TB10, through part of resistor R3 (1800 ohms), through the coil wind-



NOTES:

1. CONNECTIONS ARE SHOWN FOR 0.060 AMPERE OPERATION. FOR 0.020 AMPERE OPERATION, THE JUMPER BETWEEN TERMINALS 1 AND 2 OF TB10 IS PLACED BETWEEN TERMINALS 3 AND 4 OF TB10.

2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

TM5815-263-35-262

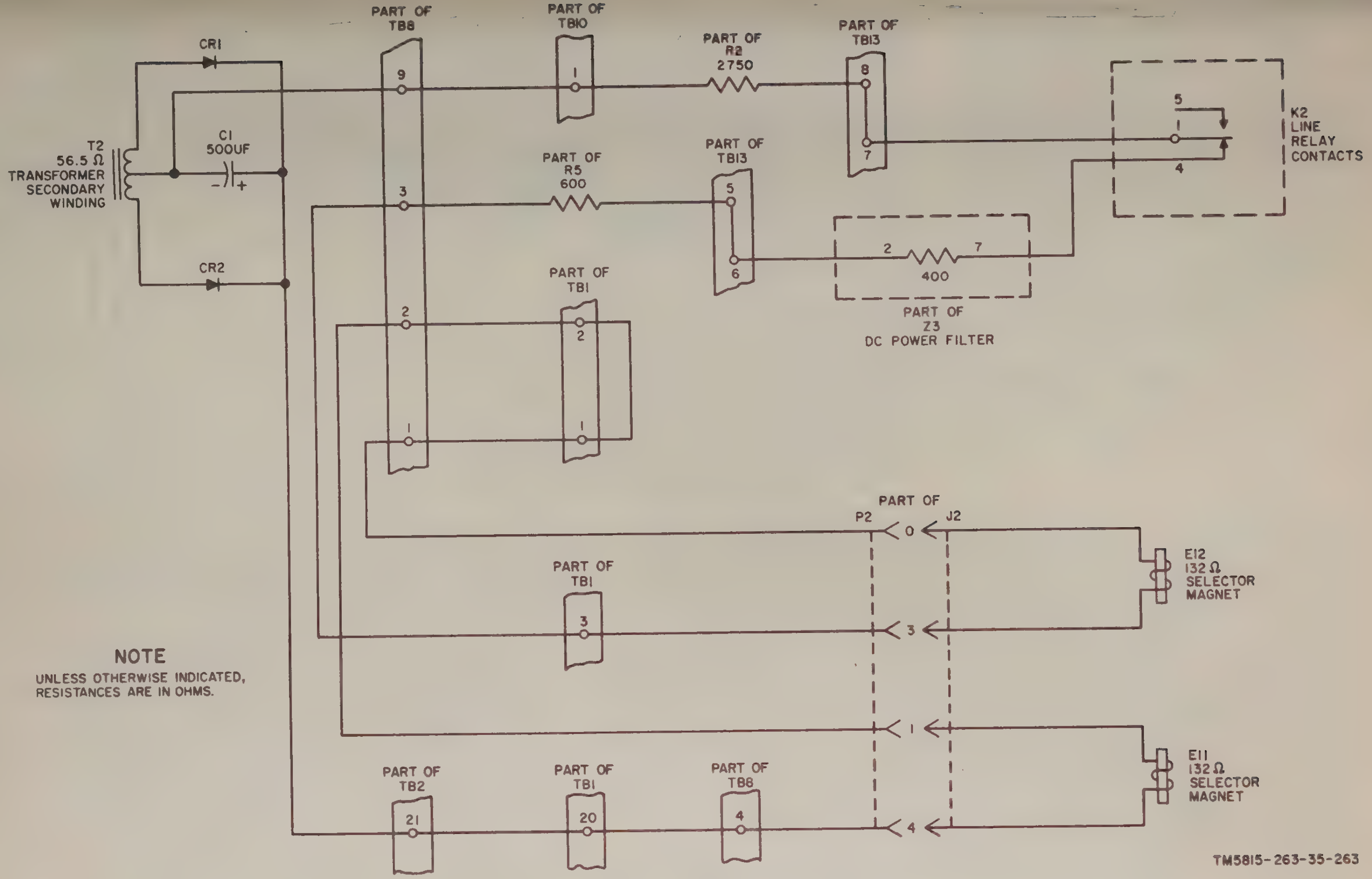
Figure 470. Dc power supply and line relay K2 bias coil circuits, simplified schematic diagram.

ing (136 ohms), through part of resistor R4 (2,000 ohms), to TB8 and back to the positive side of the power supply. For a 0.020 ampere signal line current, the strap between terminals 1 and 2 of TB10 is placed between terminals 3 and 4 connecting part of resistor R2 (4000 ohms), all of resistor R3, (5800 ohms) the coil winding (136 ohms), and part of resistor R4 (2000 ohms) to develop a 0.010 ampere bias current. Current will flow through the bias coil winding as long as the power supply is operative. The bias current energizes the line relay K2 to the spacing contact position (pin 1 to pin 5) (fig. 471) when a spacing impulse is received by the signal coil winding of K2.

c. *Selector Magnet and Signal Line Circuits.*

(1) The selector magnet circuit provides a means of receiving the marking and spacing impulses from the line relay K2, and controls the electromechanical transitions of the marking and spacing combinations. The selector magnet series circuit, that is, the complete circuit path for E11 and E12, is not changed when the signal line current is changed from 0.060 to 0.020 ampere operation. Figure 471 shows the current path for the selector magnets from the negative side of the power supply to terminal 9 of TB8, to terminal 1 of TB10, through part of resistor R2 (2750 ohms), through contacts 1 to 4 (marking) of the line relay K2, through pins 7 to 2 (400 ohms) of the dc power filter Z3, through part of resistor R5 (600 ohms) to terminal 3 of TB8, terminal 3 of TB1, through pin 3 of connectors P2/J2, through the coil winding (132 ohms) of selector magnet E12, through pin 0 of connectors P2/J2 to terminal 1 of TB8, terminals 1 and 2 of TB1, terminal 2 of TB8, through pin 1 of connectors P2/J2, through the coil winding (132 ohms) of selector magnet E11, through pin 4 of connectors P2/J2, to terminal 4 of TB8, to terminals 20 of TB1 and 21 of TB2, and back to the positive side of the power supply to complete the circuit. As long as the signal line current is not interrupted, this circuit path for the selector magnets remains energized in the marking position for both the line relay K2 and the selector magnets E11 and E12. When a spacing impulse does interrupt the signal current, contacts 1 to 5 of the line relay mate, which places a shunt circuit across the internal power supply maintaining an equal current drain on the power supply. This circuit is traced from the negative side of the power supply through part of resistor R2 (2750 ohms), through contacts 1 to 5 of the line relay, through pins 4 to 3 (400 ohms) of the dc power filter Z3, through part of resistor R4 (810 ohms), and back to the positive side of the power supply. The dc power filter Z3 prolongs the life of the line relay by providing an arc-suppression path for the contacts of the relay. For direct magnet circuit operation refer to paragraph 713.

(2) The signal line circuit provides control for operation of the line relay in its transition from spacing to marking. This transition occurs in response to the spacing and marking impulses generated by the transmitter distributor or keyboard transmitting contacts which open and close the line, respectively. Figure 472 shows the 0.060 ampere current path (power switch S3, ON) from the negative side of the signal line suppressor Z1 to terminal 15 of TB1, terminal 1 of TB9, contacts 3 to 2 of the line test switch S2, terminal 2 of TB9, to terminal 8 of TB11, through the signal line contacts 6 to 8 of E2, to terminals 5 and 4 of TB11, to terminal 11 of TB1, through pin 1 of connectors P1/J1, through contacts 1 to 2 of the line break switch S7, through pin 3 of connectors P1/J1, to terminals 3 and 4 of TB13, from terminal 4 to pin 2 of connectors P1/J1 and through pin 3 to 2 of the dc power filter Z5,


PART OF
TB8
9
3
2
1
PART OF
TB10
1
PART OF
R2
2750
PART OF
TB13
8
7
K2
LINE
RELAY
CONTACTS
5
1
4
CR1
T2
56.5 Ω
TRANSFORMER
SECONDARY
WINDING
C1
500UF
CR2
PART OF
R5
600
PART OF
TB13
5
6
2
7
400
PART OF
Z3
DC POWER FILTER
PART OF
TB1
2
1
PART OF
P2
J2
0
3
1
4
E12
132 Ω
SELECTOR
MAGNET
PART OF
TB1
3
E11
132 Ω
SELECTOR
MAGNET
PART OF
TB2
21
PART OF
TB1
20
PART OF
TB8
4
TM5815-263-35-263

NOTE

UNLESS OTHERWISE INDICATED,
RESISTANCES ARE IN OHMS.

Figure 471. Selector magnet circuit, simplified schematic diagram.

through the keyboard transmitter contacts of E7 back through the filter Z5, through pin 0 of connectors P1/J1, to terminals 2 and 1 of TB13, to terminals 9 and 8 of TB1, terminal 5 of TB8, through the signal coil winding (pin 6 to 3) of the line relay K2 to terminal 6 of TB8, to terminal 7 of TB1, terminal 130 of TB13, through pin 2 of connectors P3/J3, through pin 19 of connectors P4/J4, through pins 3 to 2 of the dc power filter Z7, through the transmitter distributor contacts of E10 back through the filter Z7, to pin 20 of connectors P4/J4, pin 0 of connectors P3/J3, to terminal 129 of TB13, to terminal 6 of TB1, terminal 9 of TB9 through contacts 5 to 7 of the line test switch S2, to terminals 7 and 8 of TB9, to terminals 5 and 4 of TB1, and back to the positive side of the signal line suppressor Z1. The circuit path is shunted past the line relay K2 and keyboard transmitter contacts E7 by the contacts 6 to 8 (fig. 468) mating in the line shut relay K1. When the send receive switch S10 is in the receive position, the contacts E7 are shunted out of the signal line. When ac power is removed from the teletypewriter (power switch S3 OFF or switch S13 motor stop ON), the signal line current is from contact 2 of the line break switch S7 to pin 3 of connectors P1/J1, to terminal 3 of TB13 (fig. 468), to terminals 10 and 13 of TB1, through the closed contacts 8 to 6 of the line shunt relay K1, to terminals 14, and 6 of TB1, and back out through the line test switch S2 to the positive side of the signal line. When the motor stop function switch S13 is used to remove ac power, the signal line circuit path is shunted past the line relay K2 as just described and in addition, the signal line contacts (E2) 6 to 8 open, 8 to 7 close placing the parallel start magnets E4 and E5 in series with the signal line circuit. The circuit path for 0.020 ampere operation is only changed slightly through the motor control assembly. The start magnets E4, E5 are connected in series and placed in series with the signal line circuit from terminal 8 of TB11, through E5 (200 ohms) to terminals 7 to 6 of TB11, through E4 (200 ohms) to contacts 8 to 7 of E2 when the motor stop condition exists. During normal operation, resistor R6 (400 ohms) is in series with the signal line circuit to compensate for the loss of the resistance of E4 and E5, and to minimize unbalance in the line. The dc power filters Z4 and Z5 provide an arc suppression network to prolong the life of the transmitting contacts of E7.

713. Dc and Signal Circuits (Direct Magnet Operation)

When the selector magnets E11 and E12 are driven directly by the 0.060 or 0.020 ampere line current, the output of the dc power supply is used only when the line test switch S2 is placed in the TEST position. The directly driven magnets are connected in parallel for the 0.060 ampere operation and in series for the 0.020 ampere operation. Setting the power switch S3 to the OFF position will deenergize the line shunt relay K1 and shunt the selector magnets and keyboard transmitter contacts E7 out of the signal line. When the motor stop function is used, the start magnets E4 and E5 operate the same as for line relay operation. The 0.060 ampere selector magnet signal path (fig. 473) (power switch S3, ON) is traced from the negative side of the signal line suppressor Z1 to terminal 15 of TB1, terminal 1 of TB9, contacts 3 to 2 of the line test switch S2, terminal 2 of TB9, to terminal 8 of TB11, through the signal line contacts 6 to 8 of E2, to terminals 5 and 4 of TB11, to terminal 11 of TB1, through pin 1 of connectors P1/J1, through contacts 1 to 2 of the line break switch S7, to terminals 3 and 4 of TB13, from terminal 4 to pin 2 of connectors P1/J1 and through pin 3 to 2 of the dc power filter Z5, through the keyboard transmitter contacts of E7 back through the filter Z5, through pin 0 of connectors P1/J1, to terminals 2 and 1 of TB13, to terminals 9, 8, 3, and 2 of TB1. The path for the selector magnet E12 is from terminal 3 of TB1 to pin 3 of connectors P2/J2,

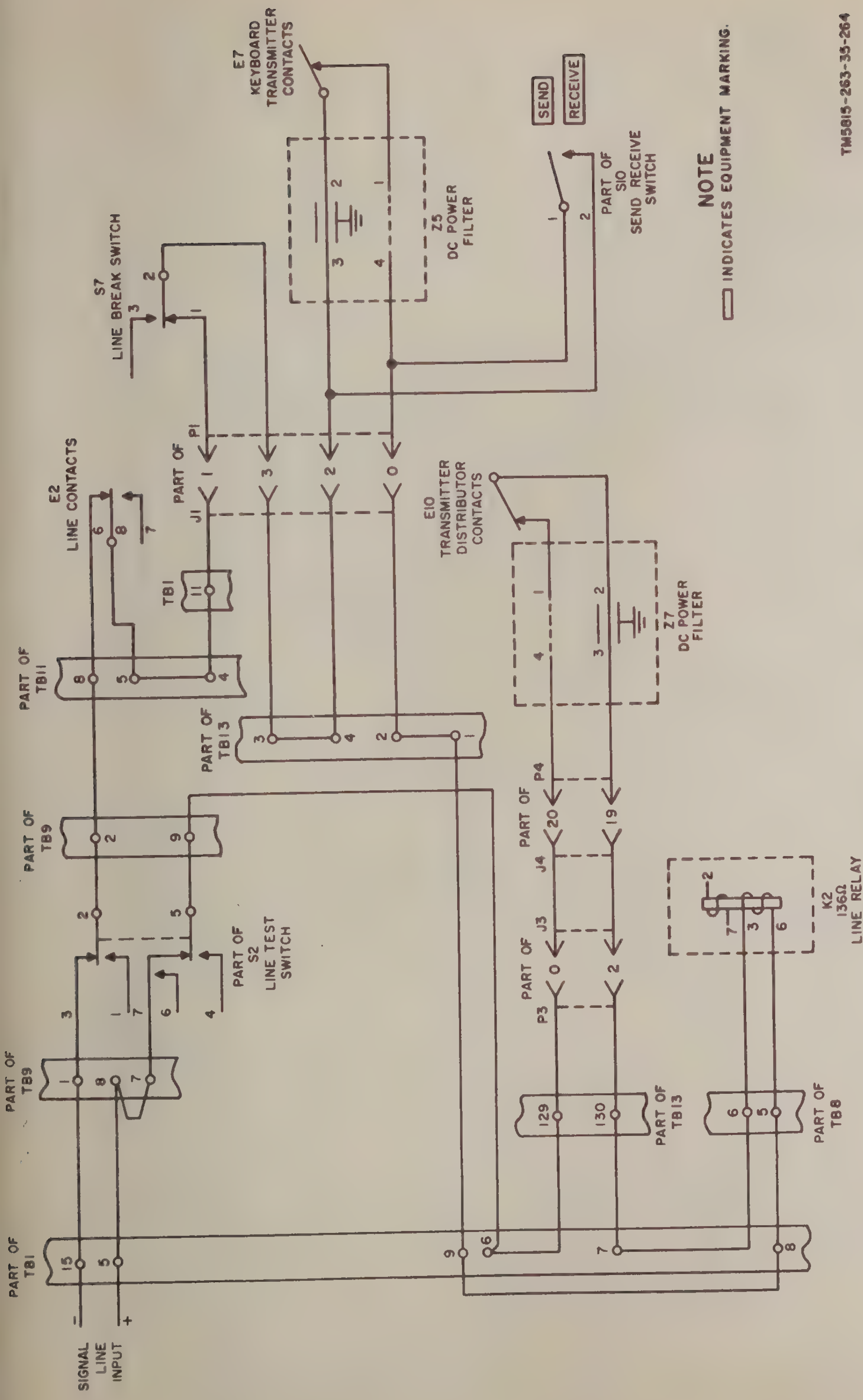

E7 KEYBOARD TRANSMITTER CONTACTS
S7 LINE BREAK SWITCH
Z5 DC POWER FILTER
PART OF S10 SEND RECEIVE SWITCH
SEND
RECEIVE
NOTE
INDICATES EQUIPMENT MARKING.
TM5815-263-35-264
E2 LINE CONTACTS
PART OF P1
J1
TB1
E10 TRANSMITTER DISTRIBUTOR CONTACTS
Z7 DC POWER FILTER
PART OF TB11
PART OF TB13
PART OF TB9
PART OF P4
J4
PART OF J3
P3
K2 136Ω LINE RELAY
PART OF S2 LINE TEST SWITCH
PART OF TB13
PART OF TB8
PART OF TB1
SIGNAL LINE INPUT
−
+

Figure 472. Signal line circuit, simplified schematic diagram.

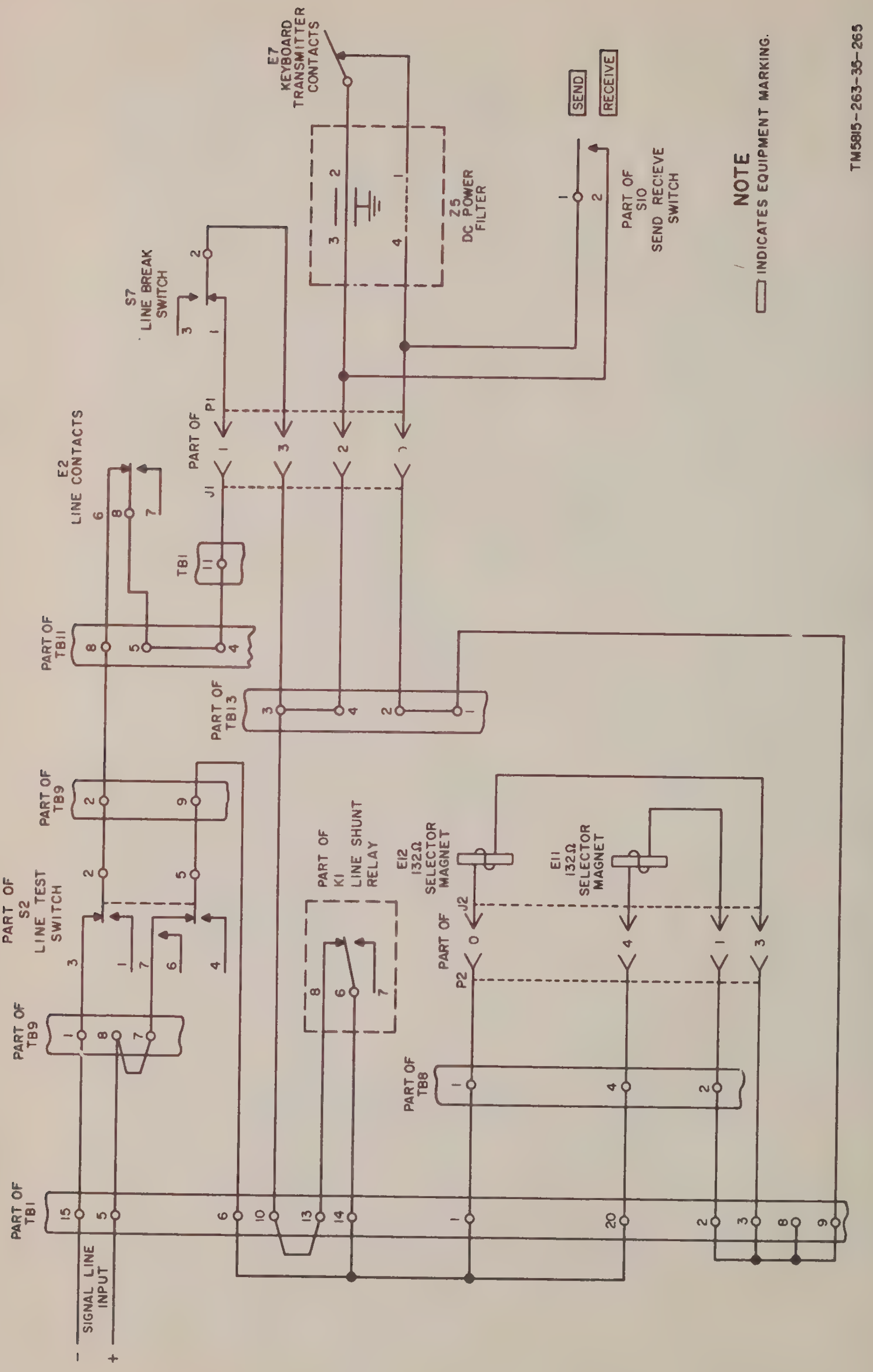
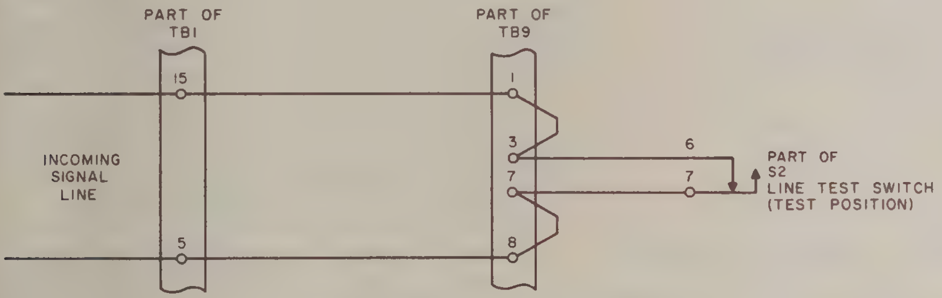
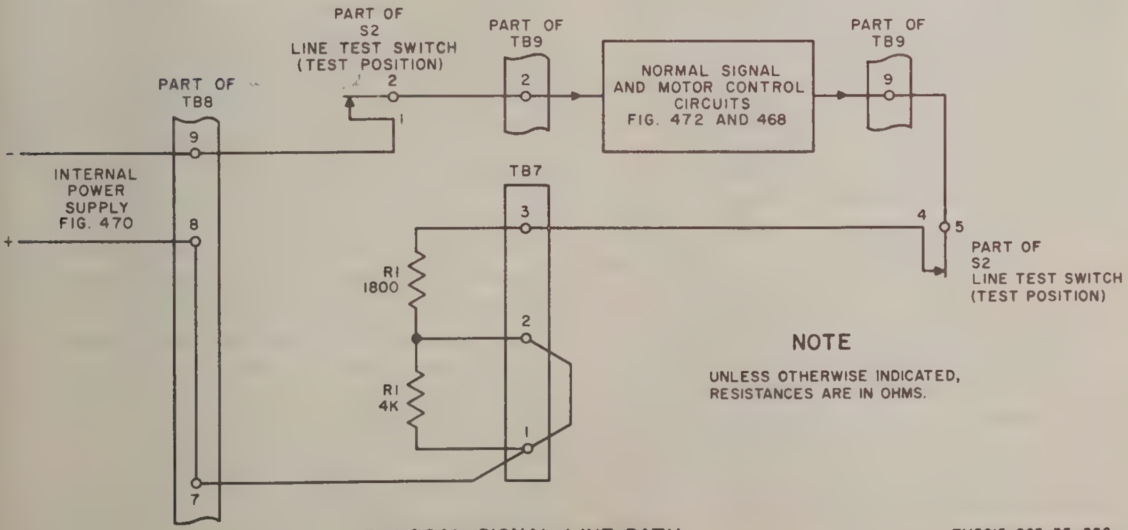

SIGNAL LINE INPUT
-
+
PART OF TB1
15
5
6
10
13
14
1
20
2
3
8
9
PART OF TB9
1
8
7
PART OF S2 LINE TEST SWITCH
3
1
7
6
4
2
5
PART OF TB9
2
9
PART OF TB11
8
5
4
PART OF TB13
3
4
2
1
TB1
11
E2 LINE CONTACTS
6
8
7
PART OF J1
P1
S7 LINE BREAK SWITCH
3
1
2
Z5 DC POWER FILTER
E7 KEYBOARD TRANSMITTER CONTACTS
PART OF S10 SEND RECIEVE SWITCH
SEND
RECEIVE
PART OF K1 LINE SHUNT RELAY
8
6
7
E12 132Ω SELECTOR MAGNET
E11 132Ω SELECTOR MAGNET
PART OF J2
P2
0
4
1
3
PART OF TB8
1
4
2
NOTE
INDICATES EQUIPMENT MARKING.
TM5815-263-35-265

Figure 478. Direct magnet circuit, simplified schematic diagram.

through selector magnet E12 (132 ohms) to pin 0 of connectors P2/J2, to terminal 1 of TB8, to terminal 1, 6, 14, and 20 of TB1. The path for the selector magnet E11 is from terminal 2 of TB1, to terminal 2 of TB8, to pin 1 of connectors P2/J2, through the selector magnet E11 (132 ohms) back to pin 4 of connectors P2/J2, to terminal 4 of TB8, and to terminals 1, 6, 14, and 20 of TB1 to complete the parallel circuit of the two magnets. At this point the path is from terminal 6 of TB1 to terminal 9 of TB9, through contacts 5 to 7 of the line test switch S2, to terminals 7 and 8 of TB9, to terminals 5 and 4 of TB1, and back to the positive side of the signal line suppressor Z1. The circuit path is shunted past the selector magnets and transmitting contacts in the same manner as for line relay operation when ac power is removed from the teletypewriter set. The 0.020 ampere selector magnet circuit path involves the start magnet circuit changes as for line relay operation (*c* (2) above) and in addition places the selector magnets in series in the signal line. The signal path change is noted from terminal 8 to 3 of TB1, through pin 3 of connectors P2/J2, through the selector magnet E12 (132 ohms) back to pin 0 of connectors P2/J2, to terminal 1 of TB8, to terminals 1 and 2 of TB1, to terminal 2 of TB8, through pin 1 of connectors P2/J2, through the selector magnet E11 (132 ohms) back to pin 4 of connectors P2/J2, to terminal 4 of TB8.


PART OF TB1
15
5
PART OF TB9
1
3
7
8
6
7
INCOMING SIGNAL LINE
PART OF S2 LINE TEST SWITCH (TEST POSITION)

A. EXTERNAL SIGNAL LINE PATH


PART OF S2 LINE TEST SWITCH (TEST POSITION)
2
1
PART OF TB9
2
NORMAL SIGNAL AND MOTOR CONTROL CIRCUITS FIG. 472 AND 468
PART OF TB9
9
PART OF TB8
9
8
7
INTERNAL POWER SUPPLY FIG. 470
-
+
TB7
3
2
1
R1 1800
R1 4K
4
5
PART OF S2 LINE TEST SWITCH (TEST POSITION)
NOTE
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

B. LOCAL SIGNAL LINE PATH

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Figure 474. Line test circuit for line relay operation, simplified schematic diagram.

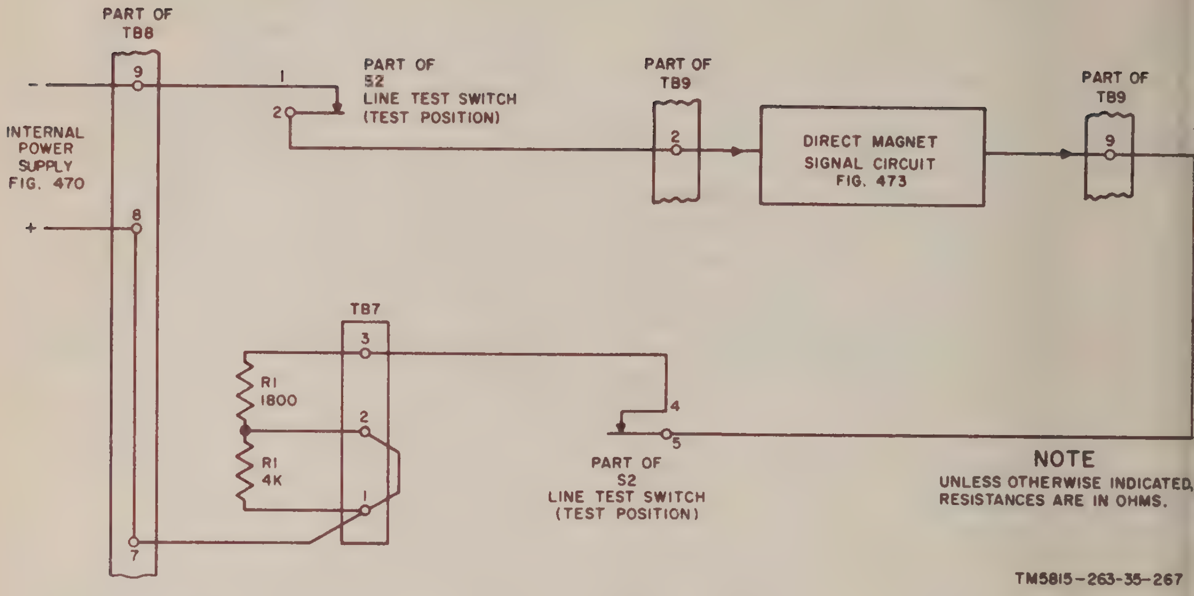

PART OF
TB8
9
8
7
INTERNAL
POWER
SUPPLY
FIG. 470
-
+
1
2
PART OF
S2
LINE TEST SWITCH
(TEST POSITION)
PART OF
TB9
2
DIRECT MAGNET
SIGNAL CIRCUIT
FIG. 473
PART OF
TB9
9
TB7
3
2
1
R1
1800
R1
4K
4
5
PART OF
S2
LINE TEST SWITCH
(TEST POSITION)
NOTE
UNLESS OTHERWISE INDICATED,
RESISTANCES ARE IN OHMS.
TM5815-263-35-267

Figure 475. Line test circuit for direct magnet operation, simplified schematic diagram.

714. Local-Test Circuit (Line Relay Included)

The local-test circuit provides a means of shunting the signal line past all circuits in the teletypewriter set and allowing use of the internally generated dc power for local line relay operation. The TEST position of the line test switch S2, therefore, will completely disconnect the local equipment from all other equipments on the signal line circuit. The internal ac power circuits will function in the TEST position of the switch is they did in the LINE position of the switch. The dc circuits which become effected when the line test switch in the TEST position are as follows:

a. External Signal Line Shunt Path. The external signal line coming into terminal 15 to TB1 (fig. 474), then to terminals 1 and 3 of TB9, is shunted through the closed contacts 6 to 7 of the line test switch S2 back to terminals 7 and 8 of TB9, to terminal 5 of TB1, and back out to the external signal line.

b. Local Signal Line Circuit. The local signal line circuit provides the means of disconnecting the equipment from the external signal line and operating the equipment locally for generation of copy or for test. The circuit path is followed from the negative side of the power supply (fig. 474) to terminal 9 of TB8, to the closed contacts 1 to 2 of the line test switch S2, to terminal 2 of TB9, (fig. 472) and through the signal path as followed by the external signal to terminal 9 of TB9, through the closed contacts 5 to 4 of the line test switch S2, to terminal 3 of TB7, through part of resistor R1 (4000 ohms), to terminals 1 and 2 of TB7, to terminals 7 and 8 of TB8, and back to the positive side of the power supply. This circuit places an additional 0.060 ampere drain on the power supply for the operation of the signal coil winding of the line relay K2. When 0.020 ampere operation is in effect, all of resistor R1 (5800 ohms) is used and the current drain is 0.020 ampere.

c. Local Motor Control Circuit. The motor control circuit of figure 474 from terminal 2 of TB9 through the motor control mechanism, and back to terminal 9 of TB9, when connected as indicated in figure 474, becomes the local motor control circuit. The start magnets place a

0.060 or 0.020 ampere drain on the internal power supply when energized and the overall control of the local signal line and ac power is the same as described in paragraph 712*a*.

715. Local Test Circuit (Direct Magnet Operation)

When the equipment is in direct magnet operation, as described in paragraph 713, the local test circuit provides the same functions and actions as described in paragraph 714 except that the local signal line circuit is changed as indicated in figure 475. This circuit requires a 0.060 or 0.020 ampere drain for the selector magnets and a 0.060 or 0.020 ampere drain for the start magnets from the internal power supply.

Section V. ELECTRICAL THEORY OF REPERFORATOR

716. General

The circuitry of the reperforator is divided into three groups: ac circuits, dc and signal circuits (line relay included), and dc and signal circuits (direct magnet operation). Figures 476 through 480 are simplified schematic diagrams of these circuit groups. The airline wiring diagram and a complete schematic diagram of the teletypewriter circuits are included at the end of this section. It is highly recommended that all maintenance personnel become thoroughly familiar with the electrical theory for this equipment and to use the schematic diagrams available for all circuit analysis work. The theory will be more easily understood if read from start to finish at the first reading.

717. Ac Circuits
(fig. 476)

The ac power applied to the reperforator components is used to activate the reperforator motor unit B2, the line shunt relay K6, the signal bell DS6, and the transformer T3. The ac power is not used for any other electrical components of the reperforator.

a. Reperforator Motor Unit B2 Circuits.

(1) The motor circuit provides the synchronous reperforator motor unit B2 with the necessary current to drive the motor. A general description of the motor unit is found in paragraph 702. The ac input power is traced from the power line suppressor Z2 to terminals 39 and 40 on TB2; from these terminals, direct wiring to the plug P6 mounted to the receptacle J6 at the top of the bracket on the reperforator base brings the ac power to the fuse F3 and terminal 1 of TB18. The fuse F3 is in the "hot" or ungrounded side of the ac input to provide protection for the internal ac circuits.

(2) When the power switch S17 is in the closed position, current flow from contact 2 to 1 of the switch to terminal 3 of TB18, through pin 9 of connectors P7/J7, to terminals 2 and 3 of TB20 back to pin 1 of connectors P7/J7, to terminals 9 and 2 of TB18, to contact 4 on the motor and through the motor components, as described in paragraph 702 to terminal 1 of TB18, and back to pin 1 of connectors P6/J6 to complete the circuit.

b. Line Shunt Relay K6 AC Circuit.

(1) The line shunt relay K6 provides a circuit action which insures continuity of the signal line circuit at all times. The relay K6 is energized whenever power is applied to the reperforator and places the equipment in series with the signal line circuit. When ac power is removed, the relay deenergizes and shunts the signal line circuit past the line relay K5.

(2) When the power switch S17 is in the closed or ON position, current flow through contacts 2 to 1 of the switch to terminal 3 of TB18, to pin 9 of connectors P7/J7, to terminals 2, 3, and 4 of TB20, through the line shunt relay coil pin 5 to 4 (1250 ohms), to terminal 8 of TB20, through pin 2 of connectors P7/J7, to terminal 7 of TB18, through pins 36 and 35 of connectors P7/J7 back to terminal 1 of

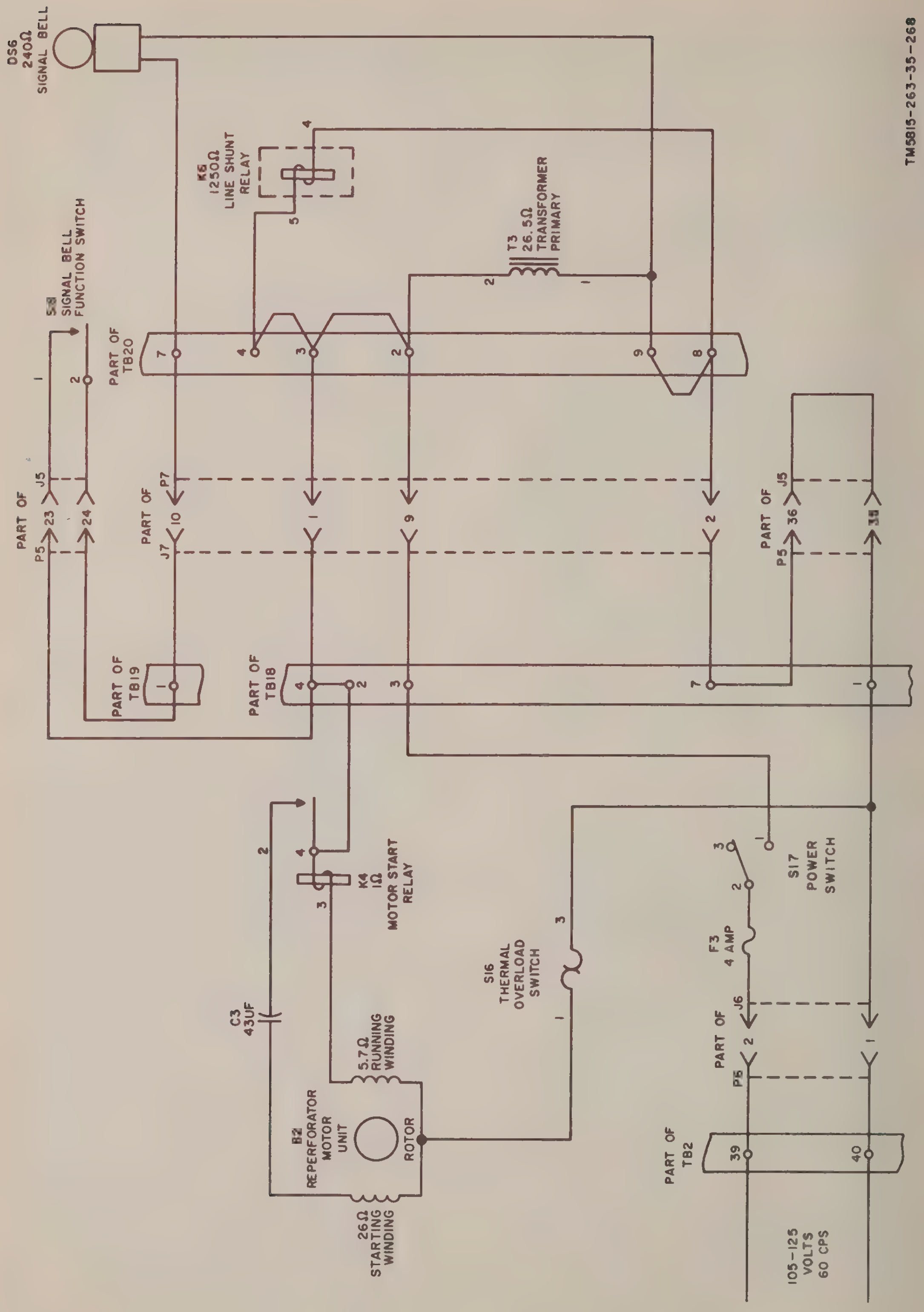

DS6
240Ω
SIGNAL BELL
S8
SIGNAL BELL
FUNCTION SWITCH
K6
1250Ω
LINE SHUNT
RELAY
T3
26.5Ω
TRANSFORMER
PRIMARY
PART OF
TB20
PART OF
P5
J5
PART OF
J7
P7
PART OF
TB19
PART OF
TB18
PART OF
P5
J5
K4
1Ω
MOTOR START
RELAY
C3
43UF
S16
THERMAL
OVERLOAD
SWITCH
S17
POWER
SWITCH
F3
4 AMP
5.7Ω
RUNNING
WINDING
B2
REPERFORATOR
MOTOR
UNIT
ROTOR
26Ω
STARTING
WINDING
PART OF
P6
J6
PART OF
TB2
105-125
VOLTS
60 CPS
TM5815-263-35-268
1
2
7
4
3
2
9
8
5
4
2
1
23
24
10
1
9
2
36
35
1
4
2
3
7
1
2
4
3
3
1
3
2
1
2
1
39
40

Figure 476. Reperforator ac circuits, simplified schematic diagram.

TB18 and to pin 1 of connectors P6/J6 to complete the circuit.

c. Signal Bell DS6 Ac Circuit.

(1) The signal bell circuit provides a means of alerting the operator at a remote teletypewriter set by the ringing of the bell.

(2) When the signal bell function switch S18 is activated as described in paragraph 708, ac power flow through contacts 2 to 1 of the power switch S17 to terminal 3 of TB18, through pin 9 of connectors P7/J7 to terminals 2 and 3 of TB20, through pin 1 of connectors P7/J7 to terminal 9 of TB18, through pin 23 of connectors P5/J5, through the closed contacts 2 to 1 of the switch S18, through pin 24 of connectors PS/JS, to terminal 1 of TB19, through pin 10 of connectors P7/J7, to terminal 7 of TB20, through the signal bell coil (240 ohms), to terminals 9 and 8 on TB20, through pin 2 of connectors P7/J7, to terminal 7 on TB18, through pins 36 and 35 of connectors P7/J7, to terminal 1 of TB18, and back to pin 1 of connectors P6/J6 to complete the circuit.

d. Transformer T3 Ac Circuit.

(1) The transformer T3 is a one-to-one power isolation transformer providing the rectifier circuit with a 115-volt source for rectification.

(2) When the power switch S17 is placed in the closed position, current flow through contacts 2 to 1 of the switch, to terminal 3 of TB18, through pin 9 of connectors P7/J7, to terminal 2 of TB20, through the primary winding of T3, pin 2 to 1 (26.5 ohms), to terminals 9 and 8 of TB20, through pin 2 of connectors P7/J7, to terminal 7 of TB18, through pins 36 and 35 of connectors P7/J7, to terminal 1 of TB18, and back to pin 1 of connectors P6/J6 completes the circuit.

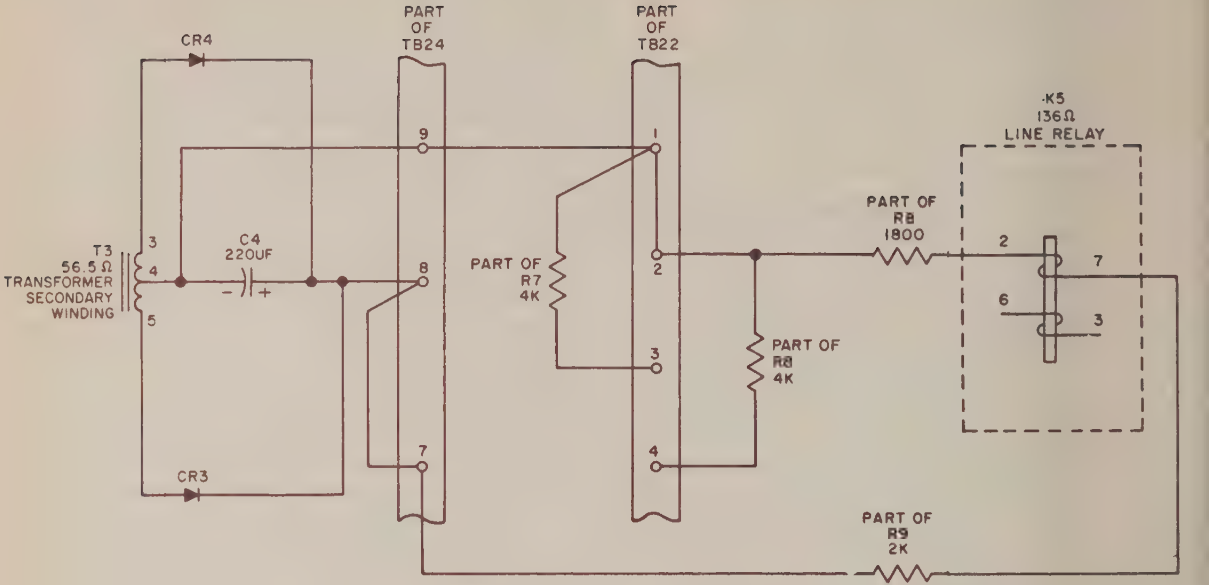
718. Dc and Signal Circuits (Line Relay Included)

The dc power developed in the reperforator power supply is used to supply bias current to the line relay K5 for either a 60 ma or a 20 ma signal line current and to energize the selector magnets E13 and E14 when the line relay K5 is energized by code signals. The dc power from the power supply is not used in the signal line circuit due to the complex balance of signal line current necessary for each net or group of teletypewriter sets on the line; therefore an external source maintains the 115 volt, 60 ma supply. The external dc signal is used to energize and deenergize the line relay during the receive operation. The detailed use of the dc power, signal power, and related ac power is discussed for each particular circuit in the paragraphs following.

a. Power Supply and Line Relay K5 Bias Coil Circuits (fig. 477).

(1) The dc power supply provides a 120 ma (maximum) 115-volt dc source for circuit operation. When ac power is applied to the primary winding of the transformer T3, the one-to-one ratio causes a 115-volt ac signal across the secondary winding. The rectifiers CR3 and CR4 are connected for full-wave rectification and develop the 115-volt dc across the capacitor C4. A constant current drain of 0.060 ampere is placed upon the power supply by a 0.030 ampere flow through the bias coil circuit and a 0.030 ampere flow through either a shunt network or the selector magnet circuit when the line relay K5 changes from spacing to marking.

(2) The bias coil circuit provides either a 0.030 ampere or a 0.010 ampere current flow through the bias coil winding, pin 2 to 7, of the line relay K5. Figure 477 shows the 0.030 ampere dc current path from the negative side of the power supply to TB24 to TB22, through part of resistor R8 (1800 ohms), through the coil winding (136 ohms), through part of resistor R9 (2000 ohms), and back to the positive side of the power supply. For a 0.020 ampere signal line current, the strap between terminals 1 and 2 of TB22 is placed between terminals 3 and 4 of TB22 connecting part of resistor R7 (4000 ohms), all of resistor R8 (5800 ohms), the coil winding (136 ohms),



NOTES:

1. CONNECTIONS ARE SHOWN FOR 0.060 AMPERE OPERATION. FOR 0.020 AMPERE OPERATION, THE JUMPER BETWEEN TERMINALS 1 AND 2 OF TB22 IS PLACED BETWEEN TERMINA 3 AND 4 OF TB22.
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

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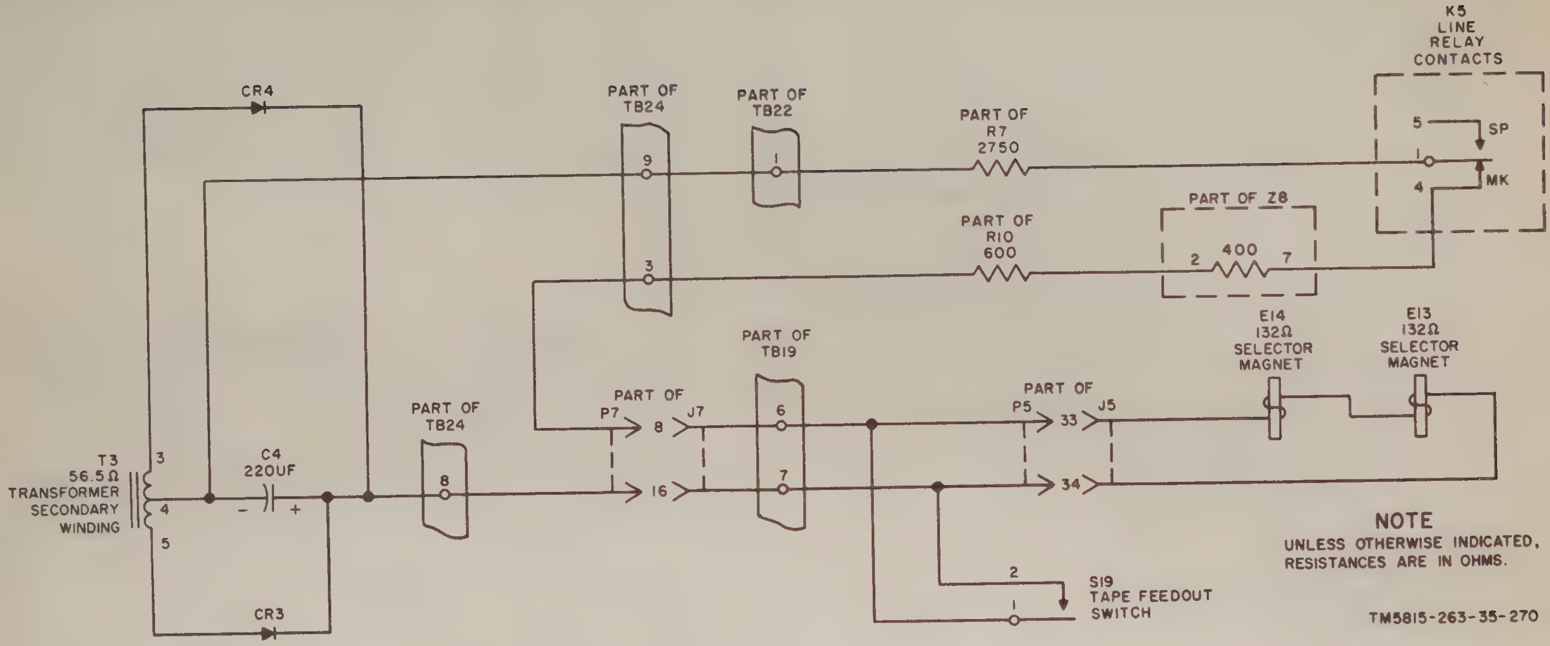
Figure 477. Reperforator power supply and line relay K5 bias coil circuits, simplified schematic diagram.

and part of resistor R9 (2000 ohms) to develop a 0.010 ampere bias current. Current will flow through the bias coil winding as long as the power supply is operative. The bias current energizes the line relay K5 to the spacing contact position (pin 1 to pin 5) (fig. 481) when a spacing impulse is received by the signal coil winding of K5.

b. Selector Magnet Dc Circuit.

(1) The selector magnet circuit provides the means of receiving the marking and spacing impulses from the line relay K5, and controls the electromechanical transitions of the marking and spacing combinations. The selector magnet series circuit, that is, the complete circuit path for E13 and E14, is not changed when the signal line current is changed from 0.060 to 0.020 ampere operation.

(2) Figure 478 shows the current path for the selector magnets from the negative side of the power supply to terminal 9 of TB24, to terminal 1 of TB22, through part of resistor R7 (2750 ohms), through contacts 1 to 4 (marking) of the line relay K5, through pins 7 to 2 (400 ohms) of the dc power filter Z8, through part of resistor R10 (600 ohms) to terminal 3 of TB24, through pin 8 of connectors P7/J7, to terminal 6 of TB19, through pin 33 of connectors P5/J5, through the coil windings of selector magnets E13 and E14 (264 ohms), through pin 34 of connector P5/J5, to terminal 7 of TB19, through pin 16 of connectors P7/J7, to terminal 8 of TB24, and back to the positive side of the power


K5
LINE
RELAY
CONTACTS
5
SP
1
4
MK
CR4
PART OF
TB24
9
3
PART OF
TB22
1
PART OF
R7
2750
PART OF
R10
600
PART OF Z8
2
400
7
E14
132Ω
SELECTOR
MAGNET
E13
132Ω
SELECTOR
MAGNET
PART OF
TB19
6
7
PART OF
P7
8
J7
16
PART OF
P5
33
J5
34
T3
56.5Ω
TRANSFORMER
SECONDARY
WINDING
3
4
5
C4
220UF
-
+
PART OF
TB24
8
CR3
2
1
S19
TAPE FEEDOUT
SWITCH

NOTE
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

TM5815-263-35-270

Figure 478. Reperforator selector magnet circuit, simplified schematic diagram.

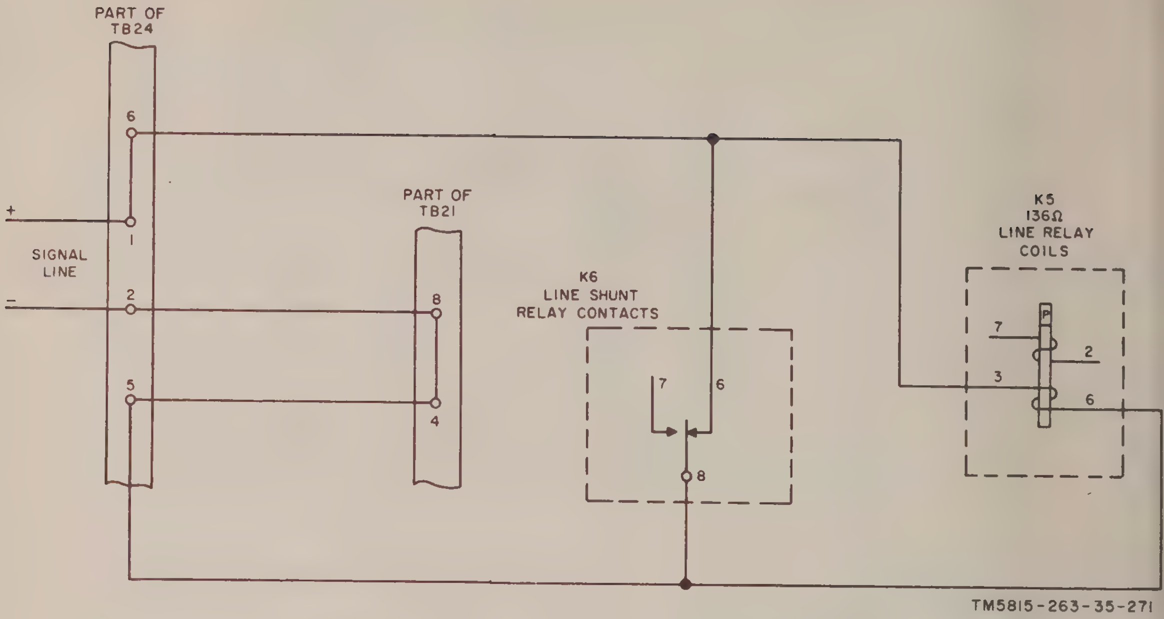


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Figure 479. Reperforator signal line circuit, simplified schematic diagram.

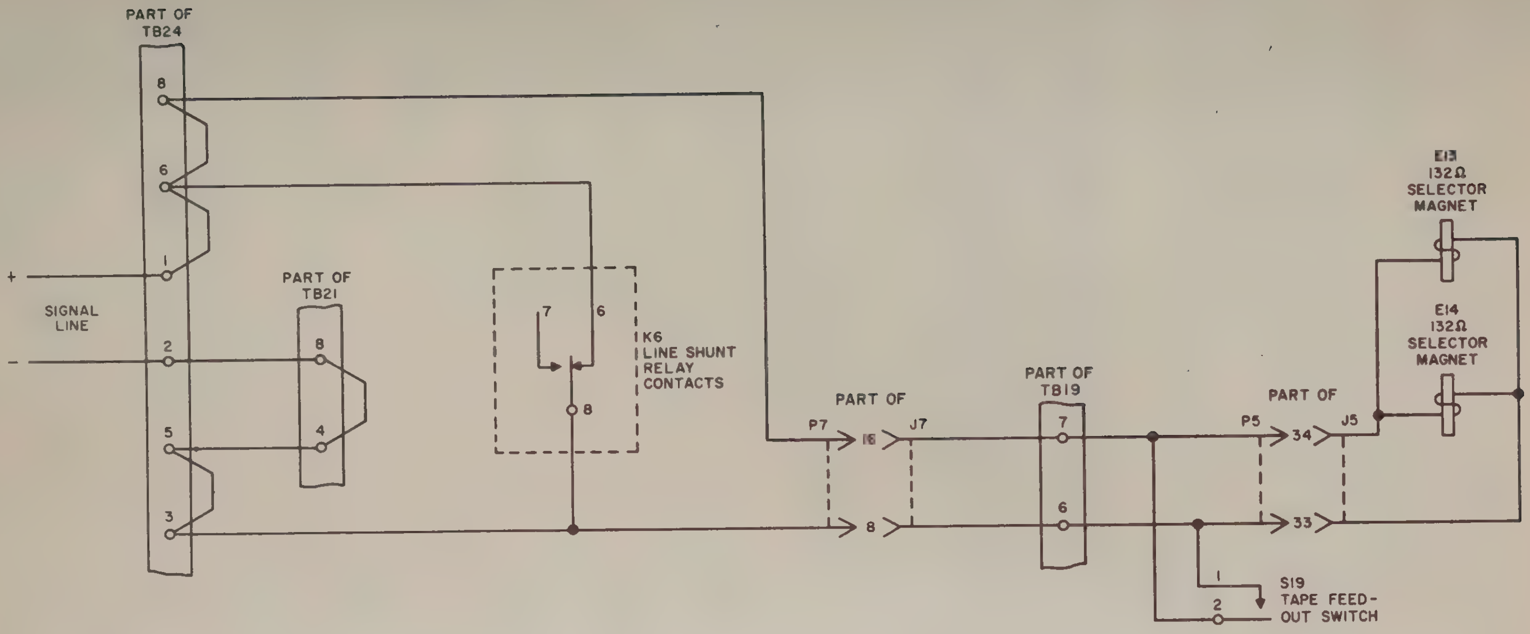
supply to complete the circuit. As long as the signal line current is not interrupted, this circuit path for the selector magnets remains energized in the marking position for both the line relay K5 and the selector magnets E13 and E14. When a spacing impulse does interrupt the signal current, contacts 1 to 5 of the line relay mate which places a shunt circuit across the internal power supply maintaining an equal current drain on the power supply. The circuit is traced from the negative side of the power supply through part of resistor R7(2750 ohms), through contacts 1 to 5 of the line relay, through pins 4 to 3 (400 ohms) of the filter Z8, through part of resistor R9 (810 ohms), and back to the positive side of the power supply. The filter Z8 prolongs the life of the line relay by providing an arc-suppression path for the contacts of the relay. For direct magnet circuit operation refer to paragraph 719.

(3) The tape feedout switch S19 (fig. 478) is connected directly across the selector magnets at terminals 6 and 7 of TB19. When the contacts of the switch mate, the selector magnets deenergized (spacing impulse) and the paper tape is mechanically fed out of the reperforator until the switch is released.

c. Signal Line Circuit (fig. 479).

(1) The signal line circuit provides control for operation of the line relay in its transition from spacing to marking. This transition occurs in response to the spacing and marking impulses, generated at a transmitting source, which open and close the line, respectively.

(2) Figure 479 shows the 0.060 and 0.020 ampere current path (power switch S17, ON) from the negative input lead to terminal 2 of TB24, to terminals 8 and 4 of TB21, to terminal 5 of TB24, through the line relay coil, pin 6 to


PART OF TB24
8
6
1
2
5
3
+
SIGNAL LINE
–
PART OF TB21
8
4
7
6
8
K6 LINE SHUNT RELAY CONTACTS
PART OF
P7
16
J7
8
PART OF TB19
7
6
PART OF
P5
34
J5
33
1
2
S19 TAPE FEED-OUT SWITCH
E13 132Ω SELECTOR MAGNET
E14 132Ω SELECTOR MAGNET

NOTE
CONNECTIONS ARE SHOWN FOR 0.060 OPERATION. FOR 0.020 AMPER OPERATION, CONNECT THE SELECTOR MAGNETS (E13 AND E14) IN SERIES.

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Figure 480. Reperforator direct magnet circuit, simplified schematic diagram.

3 (136 ohms), to terminals 6 and 1 of TB24, and back out to the positive input lead. The circuit path is shunted past the line relay coil when the ac power is removed from the line shunt relay K6 and contacts 6 to 8 mate in the line shunt relay K6.

719. Dc and Signal Circuits (Direct Magnet Operation)

(fig.480)

When the selector magnets E13 and E14 are energized directly by the 0.060 or 0.020 ampere line current, the output of the reperforator power supply is not used for any purpose. The directly energized magnets are connected in parallel for 0.060 ampere operation and in series for 0.020 ampere operation. Setting the power switch S17 to the OFF position will deenergize the line shunt relay K6 and shunt the selector magnets out of the signal line. The tape feedout switch S19 operates as for line relay operation to feed tape from the reperforator. The direct magnet signal circuit path is shown in figure 480 for 0.060 ampere operation.

Figure 481. Teletypewriter Sets AN/FGC–56 and AN/FGC–58, schematic wiring diagram.
(Located in back of manual)

Figure 482. Teletypewriter Sets AN/FGC–56 and AN/FGC–58, airline diagram.
(Located in back of manual)

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

720. General

Paragraphs 721 through 723 contain repackaging and repacking procedures for Teletypewriter Sets AN/FGC–56 and AN/FGC–58. The equipment will be repackaged and repacked as closely as possible to the manufacturer's original packaging and packing patterns, except as indicated in these paragraphs 722 and 723.

721. Materials Required

The following materials are required for packaging the equipment. For stock numbers of materials, consult SB 38–100, Preservation, Packaging and Packing Materials, Supplies, and Equipment Used in the Army.

Material	Quantity
Waterproof paper	170 sq ft
Waterproof tape	40 ft
Cotton twine	65 ft
Corrugated cardboard	170 sq ft
Adhesive tape	40 ft
Filler material	11 lb
Silica jel or other desiccant	As required

722. Disassembly

Prepare the equipment for storage in three boxes as follows:

Warning: **Be sure the signal and power line cables are disconnected from the signal and power line supply source. Contact with these cables may result in serious injury or death.**

a. Remove the typing unit from the keyboard base as follows:

(1) Disconnect the plug P2 from the receptacle J2 on the rear of the right side frame of the typing unit.

(2) Remove the four screws securing the unit to the keyboard base and lift the typing unit from the keyboard base.

(3) To prevent loss, replace the screws in the keyboard base.

(4) Remove the roll of paper and ribbon from the typing unit as instructed in paragraphs 12 and 14 of TM 11–5815–263–12.

b. Remove the keyboard base from the cabinet as follows:

(1) Remove the housing shielding the transmitter distributor.

(2) Remove the keyboard control knob and shaft by pulling it straight out.

(3) Remove the keyboard control designation plate by removing the two screws and lock washers securing it.

(4) Remove the two screws securing the left end of the front panel to the mounting section of the cross bar.

(5) Loosen the two screws securing the left end of the cross bar to the cabinet and remove the screw securing the left end of the cross bar mounting bracket section to the adjusting plate.

(6) Remove the cross bar from the cabinet by pushing the left end of the cross bar backwards not more than one inch and drawing the right end toward the left.

(7) Loosen the thumbscrew securing the front panel and slide the front panel out to the left.

(8) Loosen the coupler on the coupler shaft joining the rear bearing bracket to the

transmiter distributor bearing bracket shaft; slide the coupler to the left on the coupler shaft.

(9) Disconnect the plug P1 from the receptacle J1 on the rear of the keyboard base.

(10) Remove the four screws securing the keyboard base to the cradle assembly and remove the keyboard base from the cabinet.

(11) To prevent loss, replace the small parts and mounting hardware items removed in steps (3) through (10) above in the reverse order.

(12) Do not remove the main motor unit or perforator unit from the keyboard base.

(13) Remove the paper tape and ribbon from the keyboard base and perforator unit as instructed in paragraphs 13 and 15 of TM 11–5815–263–12.

c. Remove the power and signal line cables as follows:

(1) Remove the covers of the signal line and power line suppressors and disconnect the cable leads.

(2) Open the panel in the lower front section of the cabinet and loosen the two clamps on the 90° cable connectors.

(3) Loosen the two cord clamps and withdraw the cables from the cabinet.

(4) Replace the covers on the suppressors.

(5) Disconnect the signal line from the reperforator electrical service unit and remove the cable from the cabinet.

d. Remove the following parts from the cabinet for separate packaging and packing.

(1) Remove the line test switch knob and shaft with fork, and the power line knob and shaft with fork from the cabinet and the main electrical service unit.

(2) Remove the line relay K2 from the main electrical service unit and the line relay K5 from the reperforator electrical service unit.

(3) Remove the offset copyholder from the right side of the cabinet. Replace the mounting hardware to prevent loss.

(4) Remove the four lamps from the cabinet dome.

(5) Remove the paper tape and ribbon from the reperforator unit as instructed in paragraphs 13 and 15 of TM 11–5815–264–12.

723. Packing

Pack the equipemnt for storage as follows:

a. Secure the typing unit to the bottom pallet as shown in figure 4. Cover the unit with the waterproof paper (waxed tissue) and slide the corrugated retainer over the unit. Place the top pallet and inner carton over the unit; invert the carton and seal with adhesive tape. Invert the inner carton and place it in the outer carton. Seal the outer carton with adhesive tape.

b. Package separately, the gear sets, line relays, spare fuses, lamps, ribbon, tapes and paper rolls. Pack these items separately in a corrugated cardboard box and tie the box securely to the keyboard (between the main motor unit and the keyboard). Package and pack the above assemblage as closely as possible to the original packing as shown in figure 2. Secure the outer carton with adhesive tape.

c. Package separately, the offset copyholder, line test knob and shaft with fork, power line knob and shaft with fork and the keyboard control knob and shaft. Pack these items separately in a corrugated cardboard box and tie the box securely to an appropriate tie point in the cabinet. Apply waterproof paper to plug connectors of all cable assemblies as a protective covering; secure the paper with adhesive tape. Tie the cables to the cabinet frame with cotton twine. Using the waterproof non-staining tape, secure all plastic windows, perforator lid and all access doors to the dome, and then secure the dome to the cabinet with the tape. Fasten the cabinet to the corrugated pallet with the leveling feet and secure two bumper pads around the cabinet as shown in figure 1. Place the pads and corrugated retainer around the cabinet and slide the carton over the cabinet. Invert the carton with the cabinet inside and seal the bottom with adhesive tape.

d. If the equipment is to be stored for a considerable length of time, place a sufficient amount of desiccant in the cartons to prevent any damage by moisture. Use silica jel or other approved desiccant.

e. If shipment is to be over a great distance or extremely rough terrain, the equipment should be placed in wooden containers.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

724. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The demolition procedures outlined in paragraph 725 will be used to prevent the enemy from using or salvaging the equipment.

725. Methods of Destruction

a. Smash. Smash the controls, magnets, switches, castings, capacitors, clutches, shafts, gears, and bearings; use a sledge, axe, handaxe, pickaxe, hammer, or crowbar.

b. Cut. Cut the input power cord, the output cords, internal wiring, and external cabling; use an axe, cutting pliers, bayonet, or machete.

c. Burn. Burn all cords, wiring diagrams, technical manuals, coils, and relays; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend covers, frames, cabinets, and bases.

e. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

f. Disposal. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

APPENDIX

REFERENCES

The following publications are applicable to field and depot maintenance of Teletypewriter Sets AN/FGC–56 and AN/FGC–58.

TM 11–2208	Test Sets TS–2/TG, TS–2A/TG, TS–2B/TG, and TS–2C/TG (Teletypewriter Signal Distortion).
TM 11–2217	Distortion Test Sets TS–383/GG, TS–383A/GG, and TS–383B/GG.
TM 11–6625–203–12	Operator and Organizational Maintenance: Multimeter AN/URM–105, Including Multimeter ME–77/U.
TM 11–2513	Test Sets I–193–A, I–193–B, and I–193–C.
TM 11–5084	Radio Interference Measuring Set AN/URM–3.

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USACA (3)
USASSA (20)
USASSAMWO (1)
USASEA (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
Def Log Svc Cen (1)
JBUSMC (2)
Granite City Engr Dep (2)
Units organized under following TOE
  (2 cy ea UNOINDC)
  11-7
  11-16
  11-57
  11-98
  11-117
  11-155
  11-157
  11-500 (Tms AA-AE) (4)
  11-557
  11-587
  11-592
  11-597

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1962—610510

NOTES:

1. TELETYPEWRITER SET AN/FGC-56 CONSISTS OF THE PARTS AND WIRING SHOWN IN SECTION A OF THIS SCHEMATIC WIRING DIAGRAM. TELETYPEWRITER SET AN/FGC-58 CONSISTS OF THE PARTS AND WIRING SHOWN IN BOTH SECTION A AND B OF THIS DIAGRAM.

2. THE SPARE LEADS FROM PLUGS P2 AND P3 DO NOT CONNECT TO ANY TERMINAL POINT. THE FREE ENDS ARE TAPED AND THE LEADS ARE LACED TO THE WIRING HARNESS IN THE ELECTRICAL SERVICE UNIT.

3. UNLESS OTHERWISE INDICATED RESISTORS ARE IN OHMS; CAPACITORS ARE IN UF.

4. ☐ INDICATES EQUIPMENT MARKING.

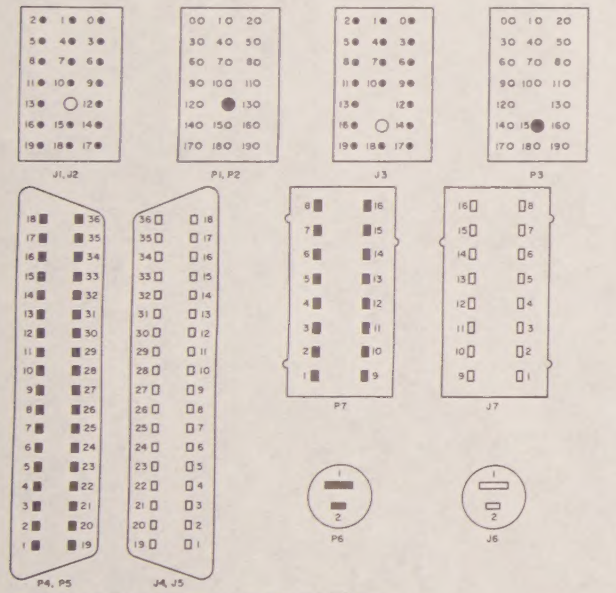
5. THE JUMPERS SHOWN ON TB7 AND TB11 ARE SHOWN CONNECTED FOR 0.060 AMP OPERATION. FOR 0.020 AMP OPERATION, REMOVE THE JUMPERS BETWEEN TERMINALS 1 AND 2 OF TB7, AND TERMINALS 4 AND 5, 5 AND 7, AND 6 AND 8 OF TB11; THEN PLACE A JUMPER BETWEEN TERMINALS 6 AND 7 OF TB11. THESE CHANGES ARE MADE FOR EITHER LINE RELAY OR DIRECT MAGNET OPERATION.

6. JUMPERS ON TB1, TB2, AND TB10, (IN THE AN/FGC-56 OR THE MAIN SECTION OF THE AN/FGC-58) ARE SHOWN CONNECTED FOR 0.060 AMP OPERATION THROUGH THE LINE RELAY. FOR 0.020 AMP LINE RELAY OPERATION, REMOVE THE JUMPER BETWEEN TERMINALS 1 AND 2 OF TB10 AND PLACE IT BETWEEN TERMINALS 3 AND 4 OF TB10. FOR 0.020 AMP DIRECT MAGNET OPERATION, REMOVE THE LINE RELAY (K2) FROM ITS SOCKET AND REMOVE THE JUMPER BETWEEN TERMINALS 20 OF TB1 AND 21 OF TB2; THEN PLACE A JUMPER BETWEEN TERMINALS 3 AND 8, AND 7 AND 20 OF TB1. FOR 0.060 AMP DIRECT MAGNET OPERATION, REMOVE THE LINE RELAY FROM ITS SOCKET AND REMOVE THE JUMPERS BETWEEN TERMINALS 1 AND 2 OF TB1, AND BETWEEN TERMINALS 20 OF TB1 AND 21 OF TB2; THEN PLACE A JUMPER BETWEEN TERMINALS 1 AND 7, 2 AND 3, 3 AND 8, 8 AND 7 AND 20 OF TB1.

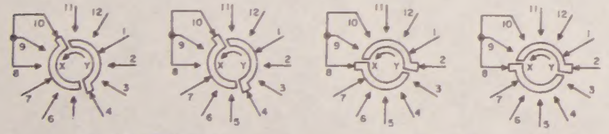
7. JUMPERS BETWEEN TERMINALS 24 AND 25, 26 AND 38, AND 23 AND 40 ARE SHOWN FOR 3-CHARACTER SELECTIVE CALLING CODE. FOR 4-CHARACTER SELECTIVE CALLING CODE, JUMPERS ARE REMOVED FROM BETWEEN TERMINALS 24 AND 25, AND 26 AND 38; AND ARE PLACED BETWEEN TERMINALS 24 AND 27, AND 28 AND 38.

8. CONNECTIONS ON TB22, TB24, AND THE SELECTOR MAGNETS (E13 AND E14) OF THE REPERFORATOR SECTION OF THE AN/FGC-58 ARE SHOWN CONNECTED FOR 0.060 AMP OPERATION THROUGH THE LINE RELAY. FOR 0.020 AMP LINE RELAY OPERATION, REMOVE THE JUMPER BETWEEN TERMINALS 1 AND 2 OF TB22 AND PLACE IT BETWEEN TERMINALS 3 AND 4 OF TB22. FOR DIRECT MAGNET OPERATION (ON EITHER 0.020 OR 0.060 AMP OPERATION) REMOVE THE LINE RELAY (K5) FROM ITS SOCKET, MOVE THE BLUE LEAD FROM TERMINAL 8 OF TB24 TO TERMINAL 6 OF TB24, AND (USING THE SPARE JUMPER) PLACE A JUMPER BETWEEN TERMINALS 3 AND 5 OF TB24. FOR 0.020 AMP OPERATION, CONNECT THE SELECTOR MAGNETS (E13 AND E14) IN SERIES, AND FOR 0.060 AMP OPERATION, CONNECT THE SELECTOR MAGNETS IN PARALLEL.

9. RECEPTACLES SHOWN FROM PIN OR RECEPTACLE END.

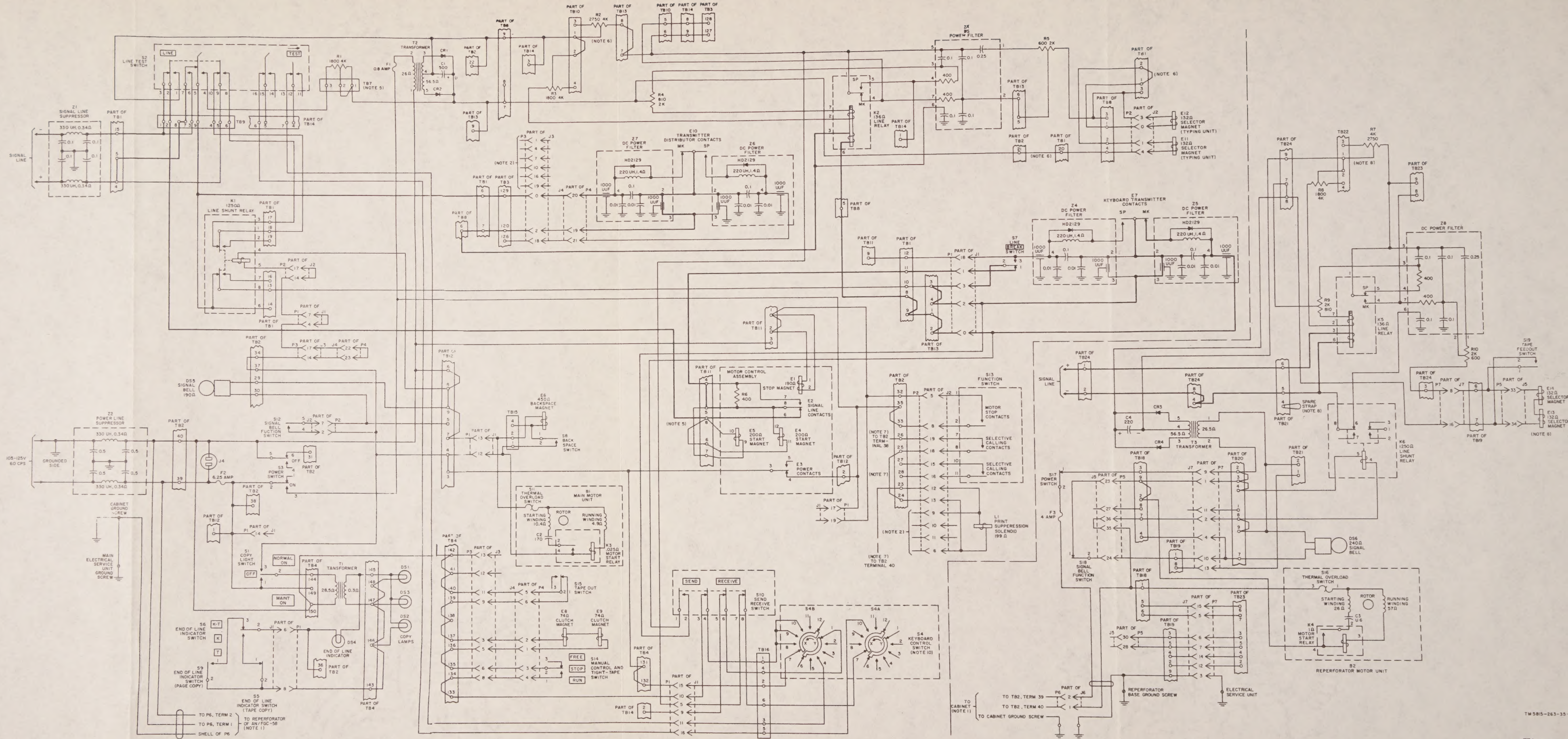

J1, J2
P1, P2
J3
P3
P4, P5
J4, J5
P7
J7
P6
J6

10. SWITCH S4, VIEWED FROM CONTROL KNOB END IS SHOWN IN [K] POSITION. ROTATE CLOCKWISE FOR [K-T], AND [T] POSITIONS SELECTION S4A IS TOWARD THE FRONT AND SECTION S4B IS TOWARD THE REAR. THROUGH A GEARED ACTION BOTH SECTIONS ROTATE COUNTER CLOCKWISE, WHEN THE KEYBOARD CONTROL KNOB IS ROTATED CLOCKWISE.


S4A
S4B
S4A
S4B
X
Y

SWITCH S4 [K-T] POSITION

SWITCH S4 [T] POSITION


SIGNAL LINE
Z1 SIGNAL LINE SUPPRESSOR
S2 LINE TEST SWITCH
LINE
TEST
T2 TRANSFORMER
CR1
CR2
R1 1800 4K
F1 0.8 AMP
TB7 (NOTE 5)
R2 2750 4K
R3 1800 4K
R4 810 2K
R5 600 2K
K2 136Ω LINE RELAY
2K R5 POWER FILTER
E12 132Ω SELECTOR MAGNET (TYPING UNIT)
E11 132Ω SELECTOR MAGNET (TYPING UNIT)
K1 1250Ω LINE SHUNT RELAY
Z7 DC POWER FILTER
E10 TRANSMITTER DISTRIBUTOR CONTACTS
Z6 DC POWER FILTER
Z4 DC POWER FILTER
E7 KEYBOARD TRANSMITTER CONTACTS
Z5 DC POWER FILTER
S7 LINE BREAK SWITCH
Z8 DC POWER FILTER
K5 136Ω LINE RELAY
R9 2K 810
R10 2K 600
DS5 SIGNAL BELL 190Ω
E6 450Ω BACKSPACE MAGNET
S8 BACK SPACE SWITCH
S12 SIGNAL BELL FUCTION SWITCH
Z2 POWER LINE SUPPRESSOR
105-125V 60 CPS
GROUNDED SIDE
F2 6.25 AMP
S3 POWER SWITCH
CABINET GROUND SCREW
MAIN ELECTRICAL SERVICE UNIT GROUND SCREW
MOTOR CONTROL ASSEMBLY
E1 190Ω STOP MAGNET
E2 SIGNAL LINE CONTACTS
R6 400
E5 200Ω START MAGNET
E4 200Ω START MAGNET
E3 POWER CONTACTS
S13 FUNCTION SWITCH
MOTOR STOP CONTACTS
SELECTIVE CALLING CONTACTS
L1 PRINT SUPPRESSION SOLENOID 199 Ω
S11 THERMAL OVERLOAD SWITCH
B1 MAIN MOTOR UNIT
K3 1025Ω MOTOR START RELAY
S1 COPY LIGHT SWITCH
NORMAL ON
OFF
MAINT ON
T1 TRANSFORMER
DS1
DS3
DS2
COPY LAMPS
S6 END OF LINE INDICATOR SWITCH
DS4 END OF LINE INDICATOR
S9 END OF LINE INDICATOR SWITCH (PAGE COPY)
S5 END OF LINE INDICATOR SWITCH (TAPE COPY)
TO P6, TERM 2
TO P6, TERM 1
SHELL OF P6
TO REPERFORATOR OF AN/FGC-58 (NOTE 1)
S15 TAPE OUT SWITCH
E8 74Ω CLUTCH MAGNET
E9 74Ω CLUTCH MAGNET
FREE
STOP
RUN
S14 MANUAL CONTROL AND TIGHT-TAPE SWITCH
SEND
RECEIVE
S10 SEND RECEIVE SWITCH
S4B
S4A
S4 KEYBOARD CONTROL SWITCH (NOTE 10)
S19 TAPE FEEDOUT SWITCH
E14 132Ω SELECTOR MAGNET
E13 132Ω SELECTOR MAGNET
SPARE STRAP (NOTE 8)
K6 1250Ω LINE SHUNT RELAY
C4 220
CR3
CR4
T3 TRANSFORMER
S17 POWER SWITCH
F3 4 AMP
S18 SIGNAL BELL FUNCTION SWITCH
DS6 240Ω SIGNAL BELL
S16 THERMAL OVERLOAD SWITCH
K4 1Ω MOTOR START RELAY
B2 REPERFORATOR MOTOR UNIT
TO CABINET (NOTE 1)
TO TB2, TERM 39
TO TB2, TERM 40
TO CABINET GROUND SCREW
REPERFORATOR BASE GROUND SCREW
ELECTRICAL SERVICE UNIT

A. TELETYPEWRITER SET AN/FGC-56

B REPERFORATOR OF AN/FGC-58

Figure 481. Teletypewriter Sets AN/FGC-56 and AN/FGC-58, schematic wiring diagram.